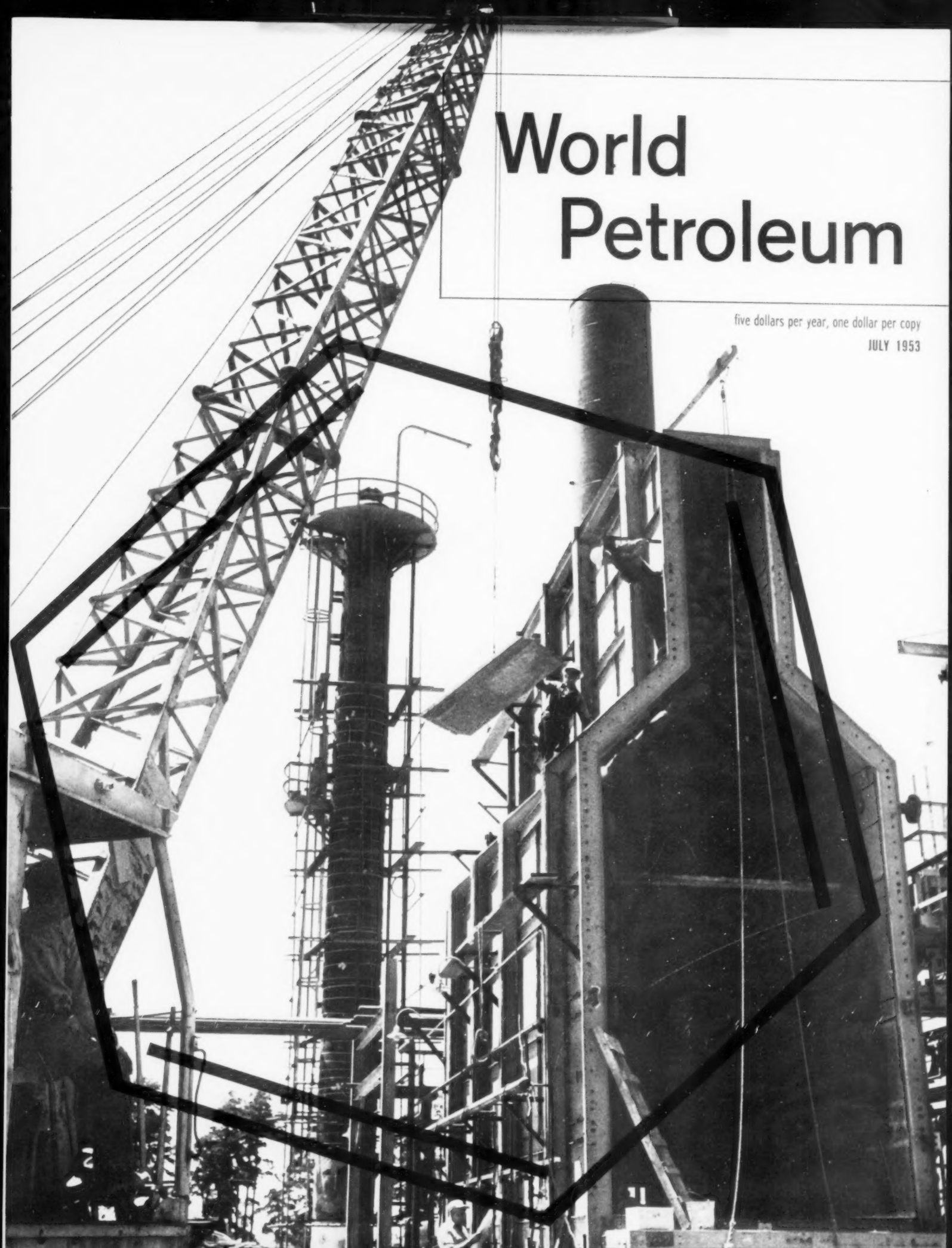
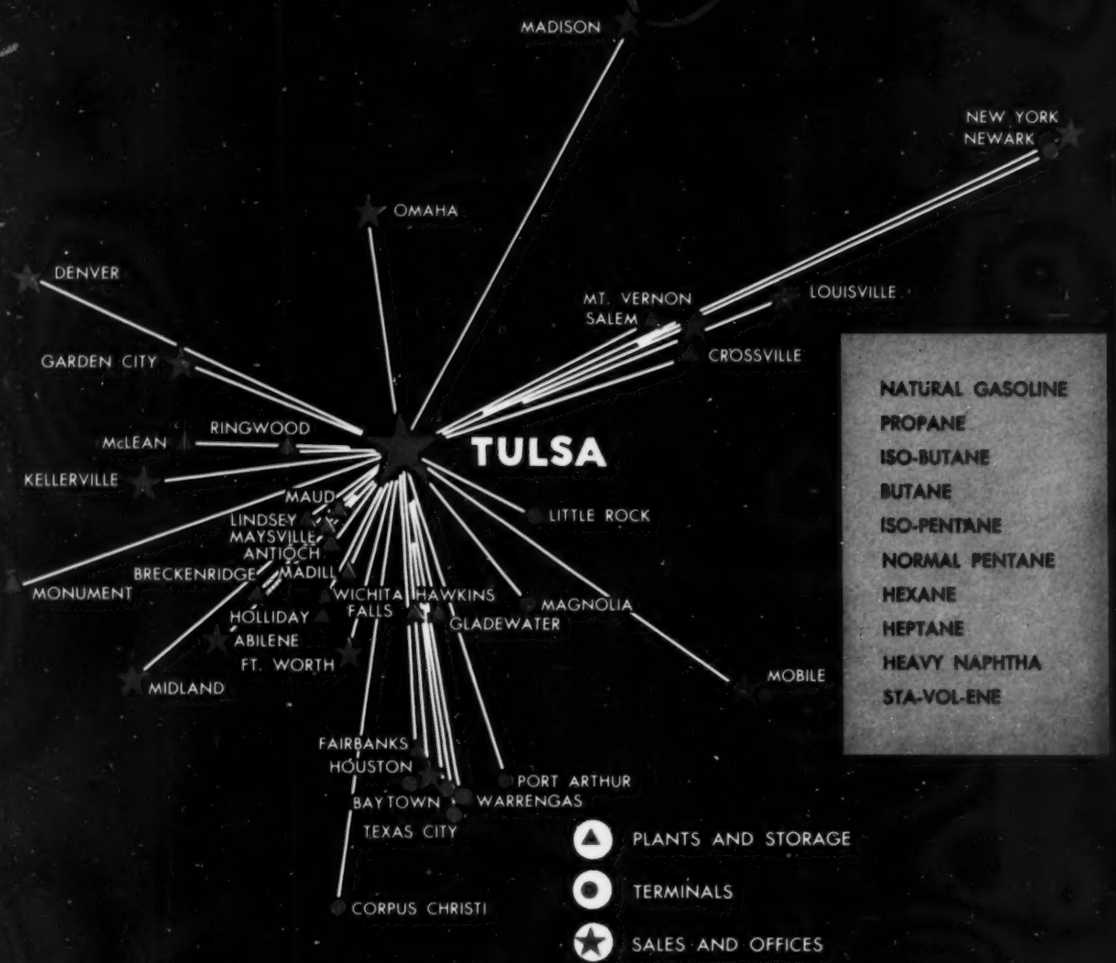


World Petroleum

five dollars per year, one dollar per copy

JULY 1953

Service Centers



NATURAL GASOLINE
PROPANE
ISO-BUTANE
BUTANE
ISO-PENTANE
NORMAL PENTANE
HEXANE
HEPTANE
HEAVY NAPHTHA
STA-VOL-ENE

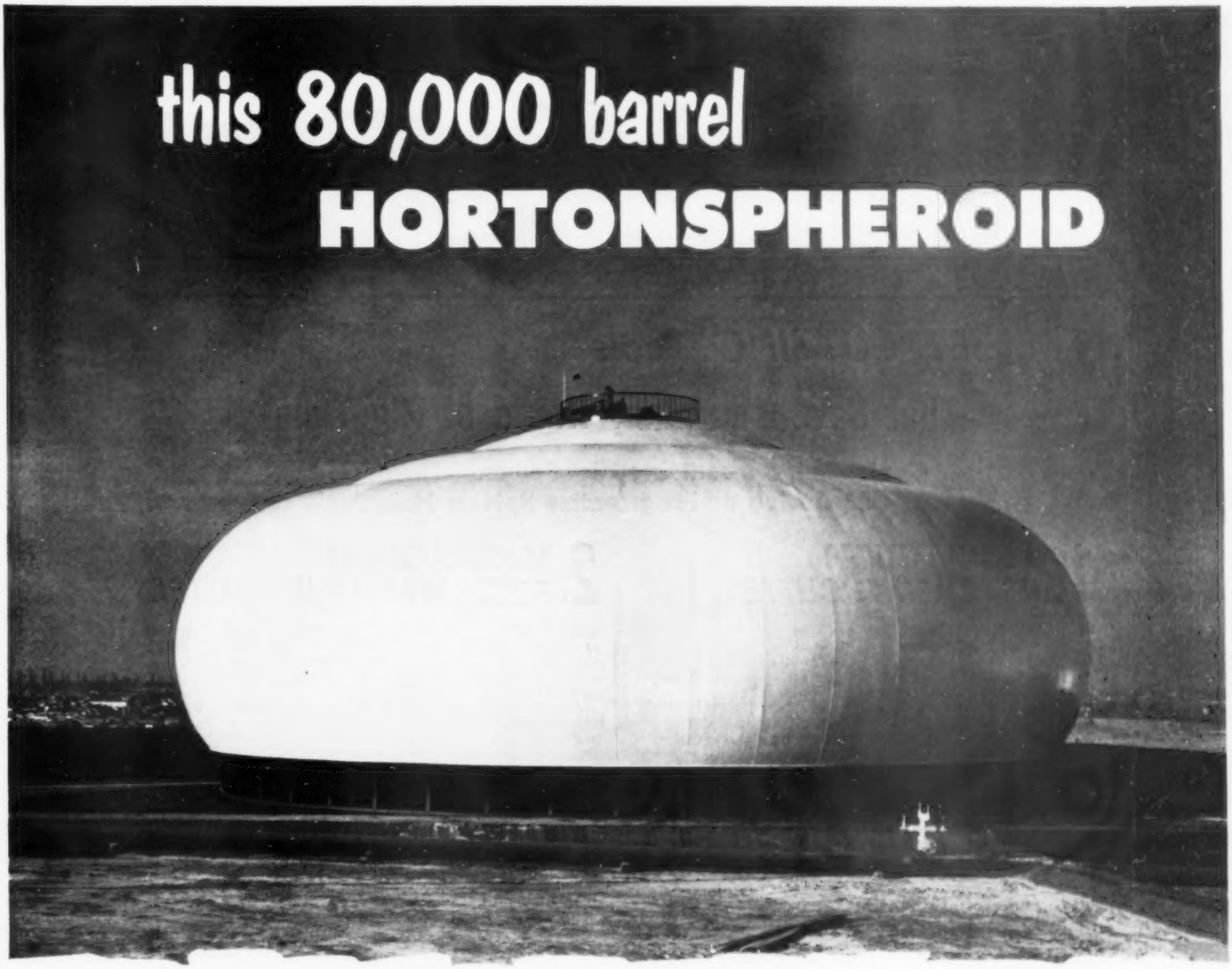
WARREN

PETROLEUM CORPORATION

TULSA, OKLAHOMA CABLE ADDRESSES: Stavolene, Warren

EXPORT TERMINALS: CORPUS CHRISTI, PORT ARTHUR, BAYTOWN, TEXAS CITY AND WARRENGAS, HOUSTON, TEXAS

this 80,000 barrel HORTONSPHEROID

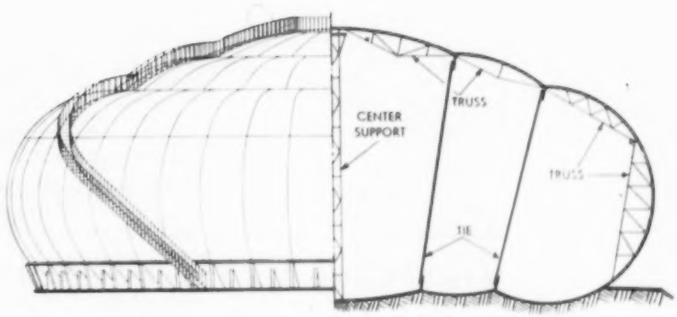


provides working storage for stabilized natural gasoline

This 127½-ft. diam. low pressure storage tank is located at the Union Oil Company's Wilmington, California refinery. Designed for a working pressure of 8 lbs. per sq. in., the 80,000-bbl. noded Hortonspheroid stores stabilized natural gasoline. Approximately 5,000 bbls. are used each day from the tank for gasoline blending purposes.

Hortonspheroids are designed so that practically all of the metal used in their construction takes stress and a minimum amount of metal is used merely to retain the shape of the structure. They are especially well adapted to the storage of motor and natural gasolines requiring low pressures to prevent evaporation losses.

Plain Hortonspheroids are available in capacities of 2,000 to 40,000 bbls. for pressures from 5 to 100 lbs. per sq. in. and noded Hortonspheroids in capacities up to 120,000 bbls. for pressures from 2½ to 20 lbs per sq. in. Further information, estimates or quotations may be obtained by writing our nearest office. There is no obligation on your part.



Cutaway view of Noded Hortonspheroid showing construction details of internal ties and trusses.

CHICAGO BRIDGE & IRON COMPANY

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What's NEW

In Perforating, Logging, and Fishing Tool Services

Latest News About New Tools, Techniques and Services

Two JET CUTTING Tools . . .

That Save You Many Hours of Rig Time

Controlled, Concentrated Jet Power — Harnessed to Cut Casing or Fragmentize Bottom Hole Junk

1. McCULLOUGH *JET CASING CUTTER*

SLASHES RIG TIME. This jet tool will accomplish a casing cutting job in only a FEW MINUTES compared to the ten hours to several days that would be required for mechanical cutting. No rotary table is needed—round trips with drill pipe or tubing are eliminated.

The McCullough Jet Casing Cutter is lowered, positioned and fired on an electric wire line. When the tool is fired, the casing is severed in a clean, straight line without damage to an outside string. This method is accepted as standard practice by major oil companies. It is an ideal companion tool for the McCullough Magna-Tector—used first to accurately locate the stuck point.

2. McCULLOUGH *BOTTOM HOLE JET CUTTER*

SIMPLIFIES AND SPEEDS the recovery of fish in the bottom of the well. Large pieces of junk at the bottom of the hole that are too large or too difficult to be easily recovered are instantly broken up into small pieces by the concentrated power of this jet tool.

Articles such as rock bits, slips, reamer bodies, etc., are fragmentized so that they can be easily recovered by usual methods. One shot is usually sufficient for small objects. Larger objects require several shots.

Operators have saved hundred of hours of rig time and eliminated many a costly fishing job by use of this reliable jet tool.

Jobs Like These Save Operators Rig Time and Money

(Actual jobs taken from McCullough Field Reports)

1. Lower half of a 12¼" hole opener twisted off. The fish was approximately 9" long and 6" wide. After trying other methods of recovery, a 6" McCullough Bottom Hole Jet Cutter was used to fragmentize the fish and the pieces were recovered by a magnetic fishing tool. The operator ran back in with a bit and made hole. Later, when he pulled out, a short sub was accidentally dropped down the hole. Another 6" jet shot was used. The fragments were easily recovered and drilling continued. Several days of lost rig time were saved on this job.

2. A 10¾" McCullough Jet Casing Cutter was used to recover 4000 feet of 10¾", 51 lb., N-80 casing. This job was performed in 5° below zero weather in only three hours—including running the cutter and freeing the pipe.

3. A 3½" O.D. McCullough Bottom Hole Jet Cutter was used to eliminate bottom hole junk at 11,495 feet. Temperature approximately 280° F. Operator had previously spent three unsuccessful days trying to drill by the junk. McCullough accomplished the job in four hours.

4. McCullough Jet Casing Cutter used to recover 13,005 feet of 5" O.D., 18 lb., N-80 casing. Temperature was above 277° F.—pressure 12,700 lbs. Total time on the job, including running a feeler, one jet cutter run and freeing the pipe—five hours.

CALL YOUR McCULLOUGH SERVICE ENGINEER

. . . or write for complete information on these two time saving, economical jet tools

PERFORATING, RADIATION LOGGING, AND FISHING TOOL SERVICE—ANYWHERE—ANYTIME.

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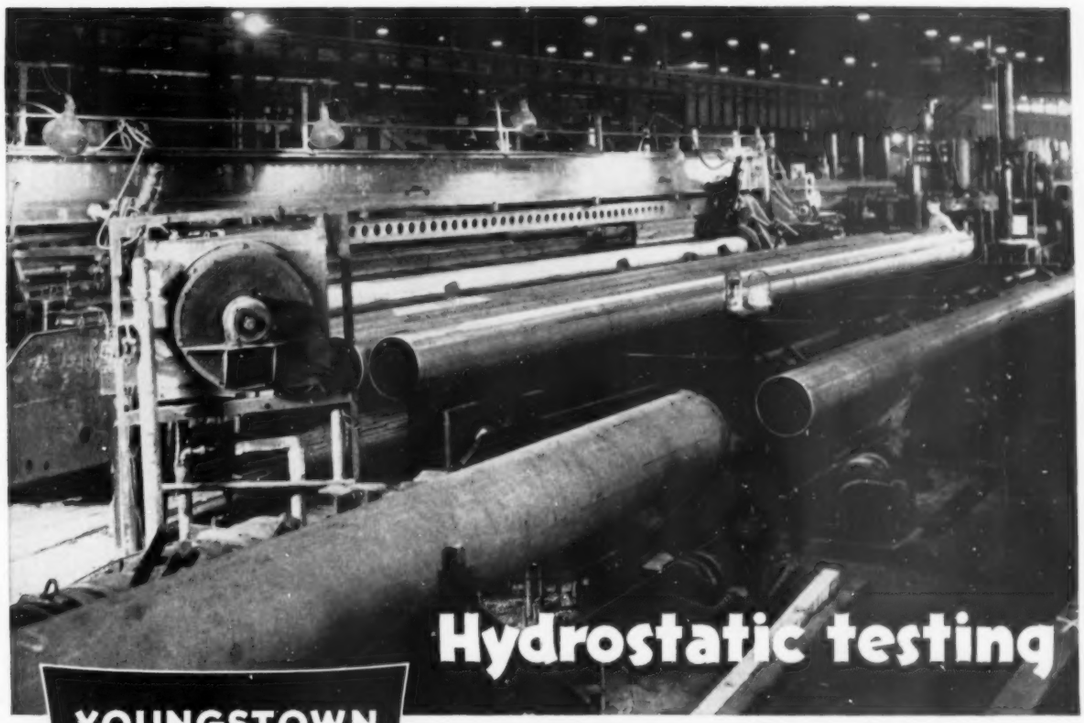

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Electric Weld
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Uniformly satisfactory in service because—

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4. Line up characteristics are excellent

PROVES EVERY LENGTH

●As a final check on its soundness, every length of Youngstown Electric Weld Pipe undergoes this hydrostatic test. Filled with water under high pressure, the pipe is struck repeatedly along the weld zone with pneumatic hammers. Only perfect pipe can survive such rigorous testing.

Youngstown Electric Weld Pipe for the oil and gas industry is being made in sizes up to 22" OD and in grades as high as X52. For further information, phone or write our nearest District Sales Office.

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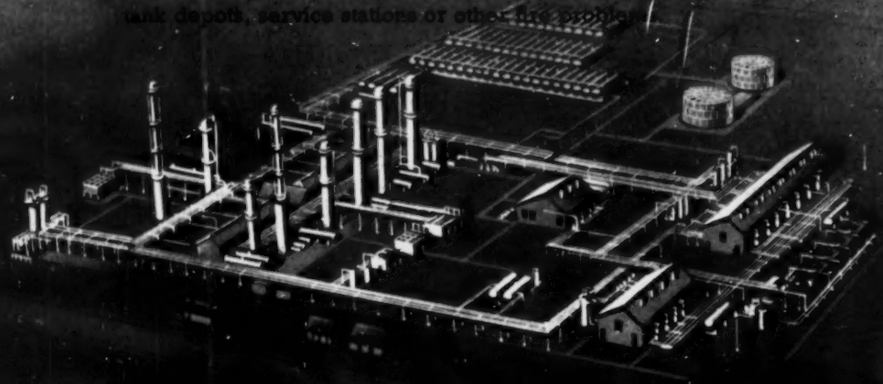

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2 New Money-Saving Reasons why you should specify IMPROVED G-E SPIRAKORE® TRANSFORMERS!

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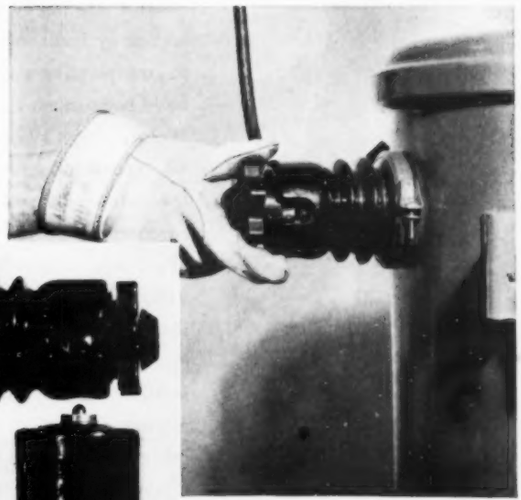

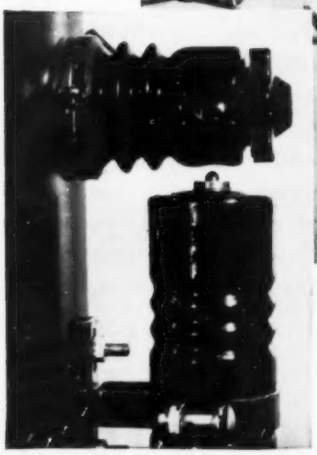

G-E engineers have again done what the world has come to expect: made equipment serve you better. This time, they've designed a new unit-type and a new conventional Spirakore transformer. These units *retain* standard G-E transformer features and quality . . . and combine them with these advanced features:

FASTER, SAFER, EASIER CONNECTIONS! Conventional and unit-type G-E transformers have NEW TANK WALL BUSHINGS. Eliminates exosed live parts. Permits safer, faster connections without tools. Cable can be brought in from either side, cap cannot drop off.

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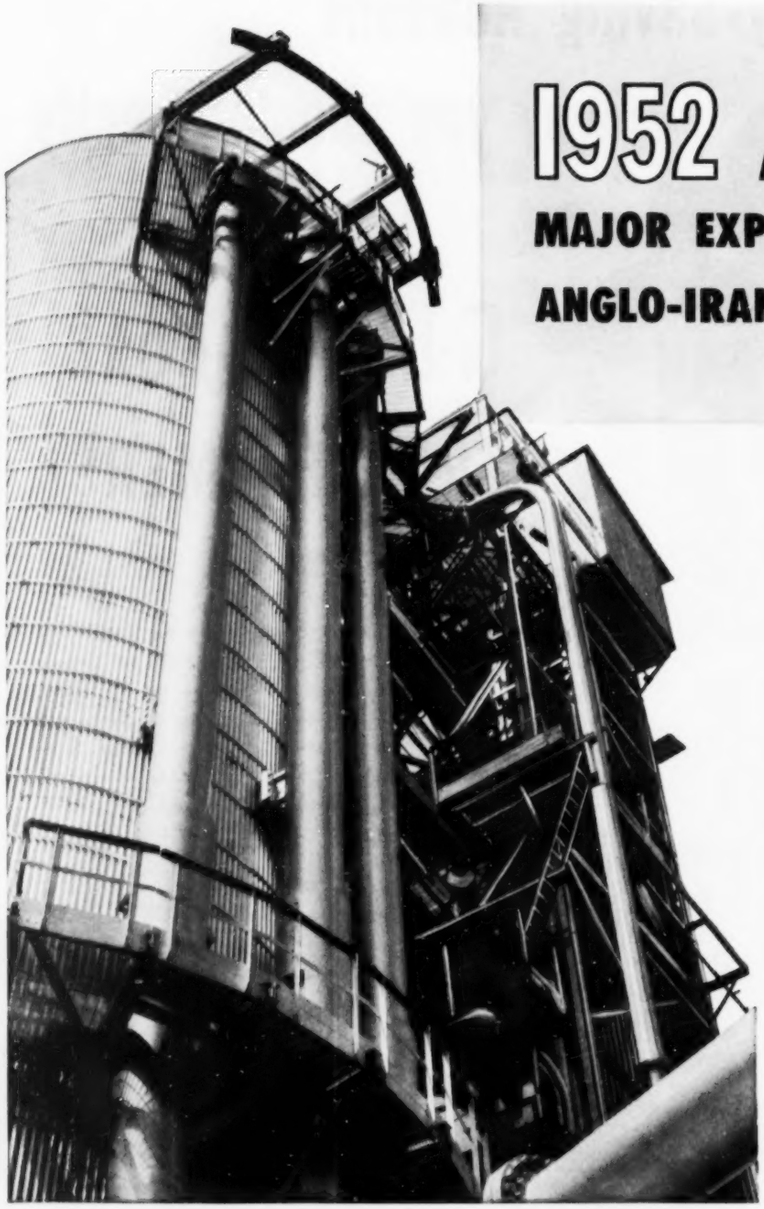


This distillation unit—Europe's biggest—is part of the Kent Oil Refinery, Anglo-Iranian's largest new plant since the Abadan shutdown.

1952 A YEAR OF MAJOR EXPANSION FOR ANGLO-IRANIAN

Anglo-Iranian's gross profits and sales in 1952—the first full year with no oil from Iran—were roughly comparable to 1949 with full oil supplies from Iran. This evidence of the company's resilience and resources, however, should not obscure the heavy impact of nationalization by Iran; without it sales volume in an expanding world oil market would have been much larger. Net profit was slightly above 1951 despite heavy capital expenditures necessary to maintain the company's position in the highly competitive world petroleum industry. Last year Anglo-Iranian spent over $160,000,000 on expansion and in 1953 plans to spend about $210,000,000, chiefly on tankers and refineries. Early in 1955 the company will have a daily refining capacity of about 600,000 barrels compared with about 366,000 barrels in 1952 and 640,000 in 1950 with Abadan in full operation.

BP

ANGLO-IRANIAN OIL

BRITANNIC HOUSE · FINSBURY

Sales

Despite the complete loss of oil from Iran, as against the 107,100,000 barrels exported during the first half of 1951, Anglo-Iranian's 1952 sales of over 670,700 barrels per day of crude oil and refined products were only 8.6 per cent below 733,600 barrels in 1951. This volume was achieved by expanding its own resources, by hiring refining capacity which processed a daily average of 62,900 barrels of its oil, and by purchasing nearly 146,700 barrels a day, mainly in the form of refined products. Purchases of crude oil were discontinued early in 1952, as Anglo-Iranian's own supplies from the Middle East were increased. Sales in the second half ran 11 per cent ahead of the second half of 1951, and sales in the early months of 1953 show an encouraging rise.

Crude Production

Anglo-Iranian's share of crude oil production in Kuwait, Iraq and Qatar increased during 1952 to 536,500 barrels per day, compared with 347,900 barrels from these sources in 1951. During 1953, this figure is expected to rise to about 733,600 barrels. AIOC 1952 offtake from Iraq was nearly doubled due to the commissioning of the new 30-inch pipeline from Kirkuk to the Mediterranean.

Refining

Chief items in the company's refining expansion are the 80,000 barrels-a-day Kent refinery near London, which started operating early in 1953, the 62,000 barrels Kwinana refinery in Western Australia, and the 100,000 barrels Aden refinery. The completion of these and the expanded output of existing refineries will give Anglo-Iranian by 1955 a total refining capacity of about 600,000 barrels per day. Not only will this allow for an appreciable extension of product sales, which in 1952 were about 460,000 barrels per day, but will provide a chain of refineries well placed to supply its markets throughout the Eastern hemisphere.

Tankers

The company's tanker fleet totals 151 ships of 1,934,000 deadweight tons. Under construction or on order are 27 ships totalling 618,000 deadweight tons, comprising 12 ships of 32,000 tons, 12 of 16,000 tons and three of 14,000 tons. The company continues to have about 2,000,000 deadweight tons of tanker shipping on charter.

Exploration

Exploration has been extended in various parts of the world—in Papua; in Nigeria; in Tanganyika and Zanzibar, where concessions have been obtained and surveys begun; in the Gulf of Paria, where test drilling is to begin; in Sicily, where surveys are encouraging; and in the Persian Gulf.

FINANCIAL HIGHLIGHTS

	1952	1951
Gross Trading Profits	£59,553,678	£71,377,882
Profit Before United Kingdom Taxation	£47,061,638	£52,217,016
Net Profit After Taxes	£25,165,966	£24,233,050
Dividends (including recommended final dividend)	£ 8,119,359*	£ 7,112,484

* Including recommended cash bonus.

Copies of the Annual Report and Accounts may be obtained from the Company's Representative in U. S. A., Mr. A. E. C. Drake, 610 Fifth Avenue, New York 20, N. Y.

COMPANY, LIMITED

CIRCUS · LONDON · E.C. 2

DISPUTE WITH IRAN

At the center of the nationalization dispute with Iran is the fact that Anglo-Iranian has been deprived of the benefit of extracting and disposing of Iranian oil for the remaining period of its 60-year Agreement of 1933 with Iran. Any award of compensation based on loss of company installations alone would fail to recognize this fact.

The Iranian Prime Minister has not only refused to take into account the loss of the 1933 Agreement but has asserted that the Agreement itself was invalid. This Agreement was the unchallenged legal basis for the company's operations in Iran for 18 years. On the strength of it, Anglo-Iranian made an investment in a foreign country of unprecedented magnitude. It was signed by the Iranian Government and ratified by the Iranian Parliament in full open session—an approval restated by the Iranian Government before the League of Nations.

No less than five major attempts have been made to settle the dispute. Three missions—from the company, the British Government, and the World Bank—made proposals which were rejected. Joint Anglo-American proposals in August 1952 were also rejected. Further proposals early this year were that (1) compensation be settled by the International Court of Justice on the basis of a United Kingdom Nationalization Law to be selected; (2) this point and method of payment agreed, the United States was prepared to make monetary advances to Iran to be repaid in oil; (3) Iran negotiate with an international organization—AIOC participating—to market her oil; and (4) the Court's award could be paid from Iran's future oil revenues, by deliveries of oil, or a combination of both. Thus Iran could have controlled her oil industry and discharged the compensation award largely, and perhaps entirely, by oil from the enormous reserves discovered by the company in Iran and by means of the highly developed productive facilities the company had installed there. These proposals, described by the United States as "reasonable and fair", were likewise rejected.

The Iranian nationalization laws of 1951 are not concrete measures for the effective payment of adequate compensation. They merely empower the government of Iran, *if it so chooses*, to deposit in a bank up to 25 per cent of future oil revenues for payment of such compensation as it may itself judge to be rightful and as the Iranian Parliament may approve, after deduction of Iran's as yet unspecified counter claims against Anglo-Iranian. Iran would become the sole judge both of its own claims and those of the company.

Iran has neither paid compensation nor agreed to a satisfactory basis for assessment and payment of compensation, and the practical effect of the laws has amounted to confiscation.

Cities Service Geologist Maurice Kennedy, in West Texas

Where's the next gas station?

WOULDN'T THIS OIL MAN like to know! It would certainly make his life simpler if nature posted signs: "Gas and Oil 10,000 Feet Below."

Nature, of course, gives hints as to where her huge underground hoards of oil may be stashed away ... rock outcrops may provide the clue to sub-surface structures and reservoirs.

These are not only difficult to read, they are often downright misleading. It's a gigantic treasure hunt—made even more difficult by false clues!

Every day thousands on thousands of motorists drive into Cities Service stations and say, "Fill 'er up!"

Few, if any, give a thought to the adventurous, risk-taking Cities Service men who devote their lives to making that casual command possible.

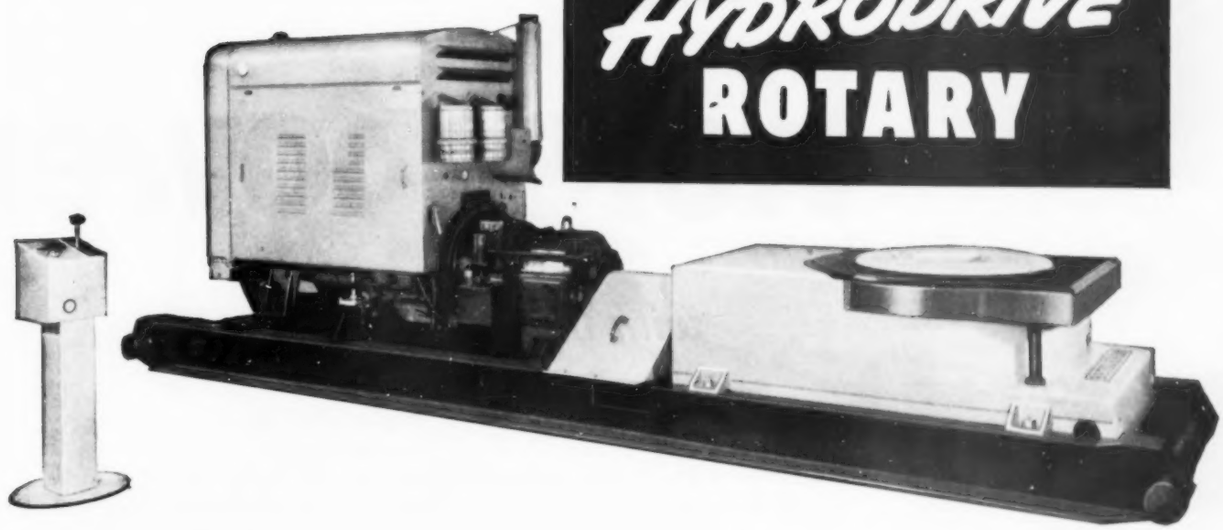
These men are trained in the sciences of geology and seismology . . . for the days of by-guess-and-by-gosh oil hunting are gone forever. Their record of "discovery wells" is high, but they dare not rest on their laurels. Americans have an insatiable thirst for oil, and the good things oil brings them.

That's why, as you read these words, a Cities Service exploratory crew is tramping over Canadian tundra . . . wading through Louisiana marshes . . . breathing the dust of southwestern deserts. Thanks to them, you can say "Fill 'er up!", confident that the answer will be a brisk "Yes, SIR!"—instead of "Sorry, Mister. That's all there is, there ain't no more."

CITIES SERVICE

Quality Petroleum Products

Why you're ahead with a BETHLEHEM *HYDRODRIVE* ROTARY



While Bethlehem makes and will gladly furnish rotary tables for drawworks hook-up, we'd like to point out the many advantages of the Hydrodrive rotary unit with independent engine.

First of all, what does Bethlehem offer in this respect? We offer the two most commonly-used sizes—21-in. and 17½-in., *both standard tables*. Either is available with gas or diesel engine and *torque-converter drive*. The system has *two forward transmission ratios, one reverse*.

The flexibility—"independence"—of Bethlehem's Hydrodrive tables makes possible great gains in your drilling set-up. For instance, there's reduced wear on the drawworks. There's complete control at the driller's fingertips. There's an infinite number of speeds from zero to maximum. With separate rotary drive, you are not draining power from the drawworks engines; more power, therefore, is available for the pumps.

Here are some other advantages: greater safety (no chain drives between drawworks and table) . . . more pipe-racking space . . . ready portability (fine for rathole digging) . . . drive and controls that make the units perfect for fishing.

Bethlehem Hydrodrive tables can be used at floor level or underneath the floor, whichever you prefer. And there are other features, too, that you'll want to investigate—because they mean an easier type of drilling. Write for information; complete details will be sent promptly.

Bethlehem also manufactures a complete line of slush pumps and drawworks for shallow, medium, and deep drilling; also crown and traveling blocks, and swivels; and, for production work, pumping units in a wide range of sizes and types. Ask for literature.

BETHLEHEM STEEL

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with the Veedol Motor Oil "Film of Protection"

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Now you can *seal in* all that power . . . with the famous VEEDOL "Film of Protection."

VEEDOL Motor Oil *seals in* horsepower by resisting blow-by! It contains detergent additives that suspend contaminants, leaving your engine cleaner after draining. And it combats the metal-eating action of "engine sweat" by forming the famous anti-corrosion "Film of Protection" on metal surfaces.

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It's an International chain—with links formed from International Industrial Power that offers you units for every phase of any kind of earthmoving work.

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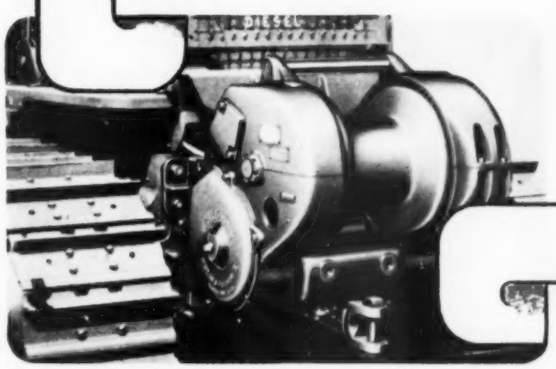
For all facts on International Power and the equipment that works with it, see your International Distributor. What's more, he has service and maintenance facilities to back it up.



Shown are some of the outstanding allied equipment lines: Pullman-Standard Klearing-Blade with TD-18A tractor, Drott Skid-Shovel and TD-9 tractor, Carco Winch on TD-18A tractor, Bucyrus-Erie Bullgrader with TD-24 tractor, Hough Payloader.

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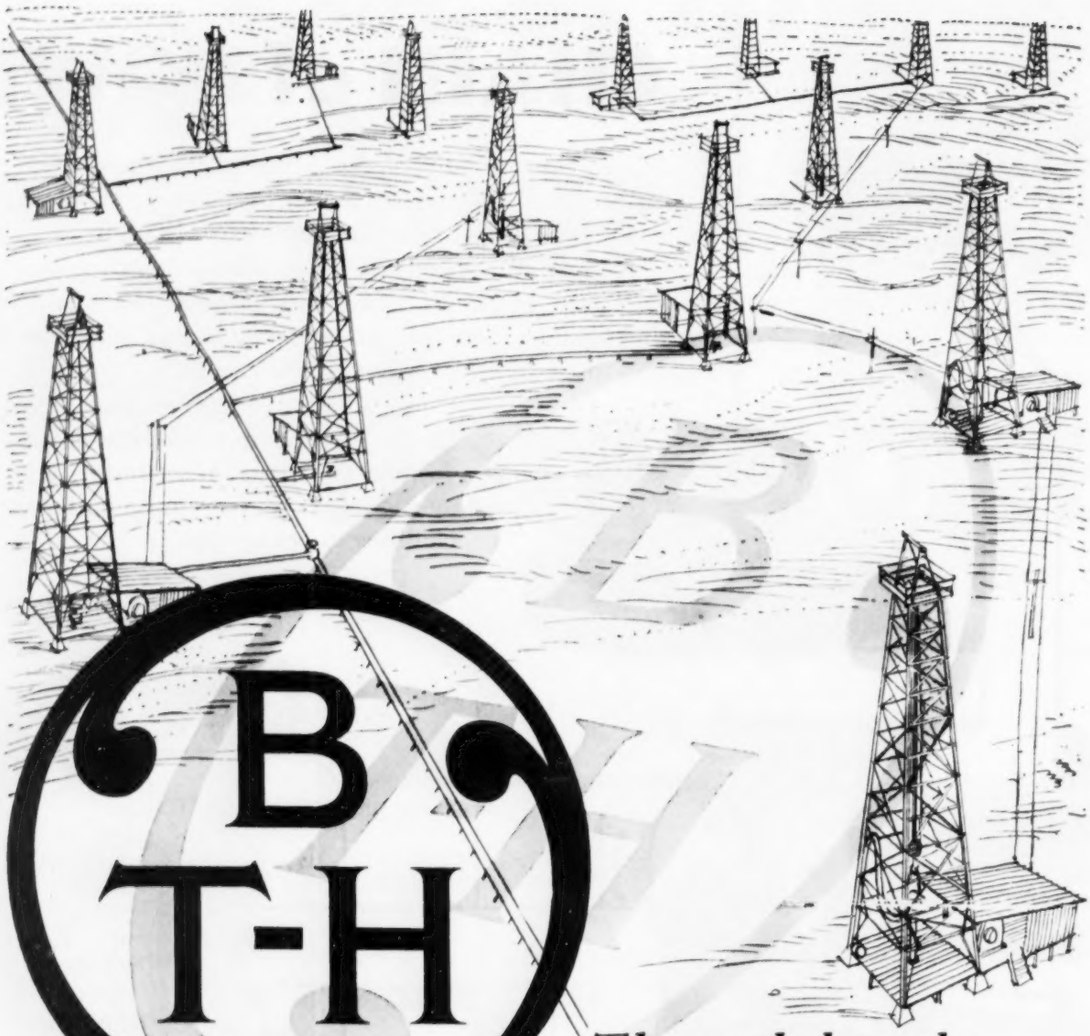


B
T-H

The symbol on the
Best Electrical Equipment

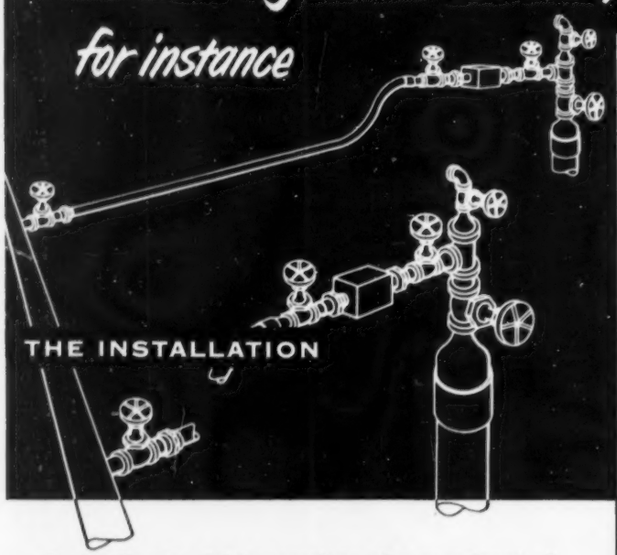
Hard and continuous service is demanded of any electrical equipment in the oil industry. That is why in the fields so many of the generators, motors, starters, and other devices bear the initials BTH—symbol of sound design and of guaranteed reliability in service.

But this is only one direction in which the specialisation and long experience of BTH have built up an enviable reputation. It is the same in mining, power supply, traction, marine engineering, and general industry—wherever first-class electrical products are needed. With over fifty-four years' experience and eleven factories, BTH can give outstanding service to industry in every sphere of electrical engineering.

THE
BRITISH THOMSON-HOUSTON

Throughout the Eastern Hemisphere, the free peoples of 67 lands assist *Caltex* in finding, refining and marketing petroleum products. In each country, *Caltex* employs mostly nationals. And in the wake of fuller employment come new industries to serve the needs of these countries.

Valve Performance that Speaks for itself ...on Well Injection Service, for instance



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SUITABILITY:	Best by test
FEATURES:	Hard, tough, nickel alloy disc
MAINTENANCE COST:	Routine care only
SERVICE LIFE:	Now in line more than 4 years
OPERATING RESULTS:	Proper control of system
AVAILABILITY:	Crane catalog item – No. 624E

In the Kansas field operations of a prominent oil company, with Crane Bronze Gate Valves on injection lines to wells for oil production by water flooding. Working pressure approximately 900 psi.

THE CASE HISTORY

Originally, this well-flooding system was installed with plug valves which proved a severe handicap. Corroded by the salt water, the valves stuck so hard they couldn't be operated to cut in or shut off wells on the line.

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More than 4 years ago, Crane No. 624E Bronze Gate Valves were put on the system. Corrosion and leakage were eliminated. Valve operation became smooth, easy, positive—the way it should be. And, ever since, that's how these Crane valves have performed. No wonder this producer, like many others, has hundreds of them in similar service.

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Crane No. 624E gate valves have unusually heavy metal sections and are ruggedly constructed throughout for high pressure service. Body and bonnet are of Crane Special Bronze, a high-grade leaded tin bronze. Disc is of hard, tough Crane Nickel Alloy. Better Crane quality in every detail makes them last and last. Sizes up to 2 in. rated at 1,000 psi. W.O.G. See your Crane Catalog or ask your Crane Representative for demonstration.

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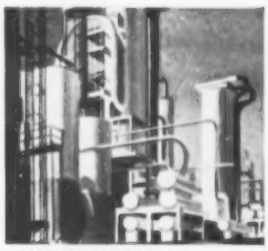

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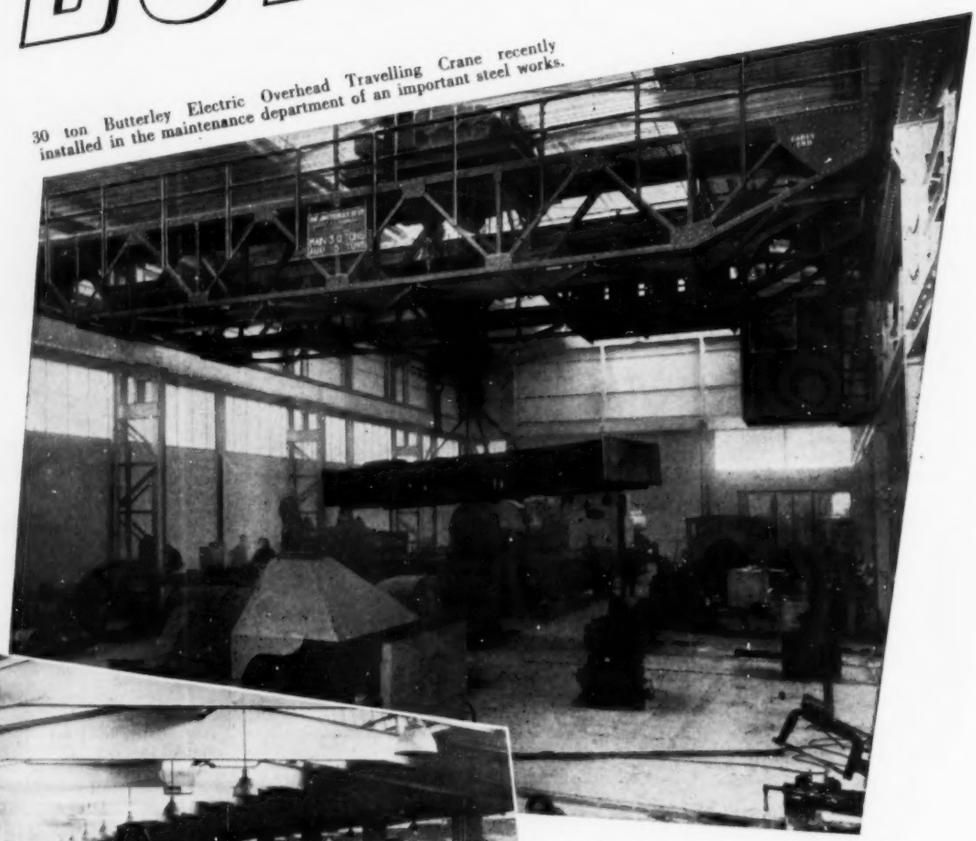
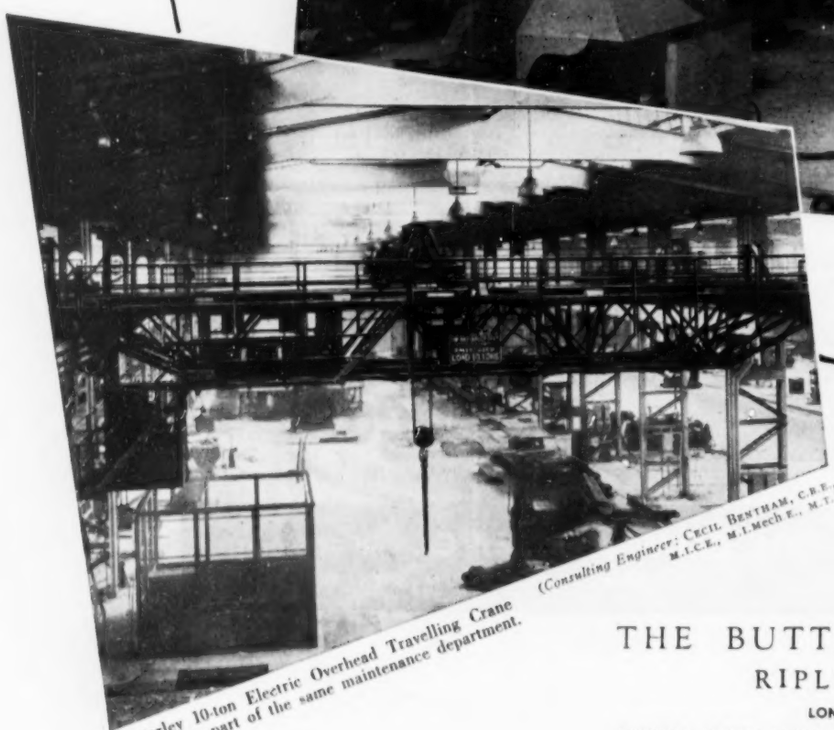
ELECTRIC OVERHEAD TRAVELLING CRANES

by BUTTERLEY



30 ton Butterley Electric Overhead Travelling Crane recently installed in the maintenance department of an important steel works.



Butterley 10-ton Electric Overhead Travelling Crane in another part of the same maintenance department.

(*Consulting Engineer*: CECIL BENTHAM, C.B.E., M.I.C.E., M.I.Mech.E., M.I.E.)

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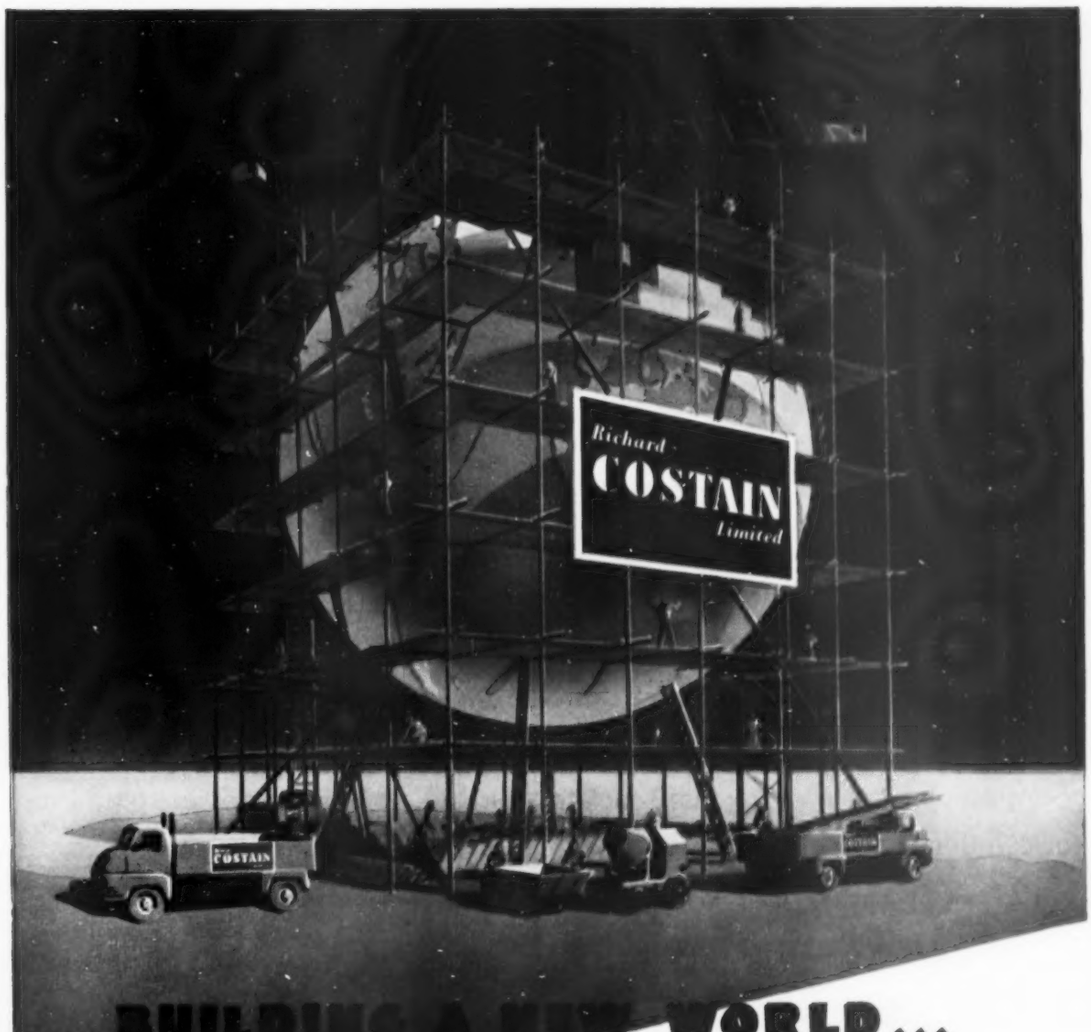

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THIS MONTH'S COVER

Constructing the Platformer heater at Skelly Oil Company's refinery at Longview, Texas. Superimposed is the benzene ring to suggest the part that catalytic reforming is taking in increasing the available supply of aromatics.

The Testing Tool on Tomorrow's String

We're prone to take for granted the practices of today. Yet a few years ago they were just ideas being thoroughly worked out in research laboratories. For example, there's Halliburton's new Hydrospring Tester. Years of research have gone into developing this revolutionary tool. And a full year of field use proved its performance with a perfect record on more than 1500 jobs. Now a successful test with Hydrospring is taken for granted. And the scientists who developed it are busy on new research projects in tools and technology. This research is the testing tool on tomorrow's string, probing into the formations of the future. That's what makes Halliburton first in its field, for such energetic research holds the place of highest concern at Halliburton.

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PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES

OIL INDUSTRY'S PROBLEM OF CONVERTIBILITY

HOPE for early establishment of convertibility of the currencies of leading commercial nations is brighter than has been generally realized if one is to accept the opinion expressed by Ivor Rooth, managing director and chairman of the executive board of the International Monetary Fund. Addressing the conference of members of the International Chamber of Commerce at its recent meeting in Vienna, Mr. Rooth said that his organization is in a position to assist any nation that really desires convertibility and is willing to face some of the risk involved in such a move.

Confidence in the ability of the International Monetary Fund to lead in a movement for the establishment of commercial convertibility is based upon its current holdings of $3,200,000,000 in gold and convertible currency and upon the growing recognition of the conditions needed to make freer exchange workable. The greatest obstacle to its realization is the unwillingness of politicians in certain countries to resist the inflationary measures that are pushing their fiscal organizations deeper and deeper into the quicksands of undependability. International organizations for the handling of money and credit undoubtedly have won greater respect and influence through the successful operation of those now in the field. Mr. Rooth referred to the stronger position of the monetary fund by saying that it was now "meeting its first real test, that it had overcome the timidity and rigidity that marked its earlier operations and that it was in a position to aid effectively in making available substantial sums for the purchase of outside currencies to any nation that has instituted measures to place its internal and external policies in order."

That final phrase defines the most serious obstacle to effective international action. Everyone is agreed "in principle" that full convertibility is desirable. Many who do not believe that the moment for its inception has yet arrived feel that means will be found in the not too distant future to set up a system of convertibility for commercial accounts though possibly not for capital transactions. It is noteworthy that support for moves toward establishing such a system finds approval among the representatives of nations with relatively strong currencies. Only those representatives who consider it hopeless to induce their lawmakers to accept fiscal reforms oppose the setting up of such an organization until it can be made fully inclusive.

The most that can be said of the proposal for general convertibility of currencies is that the idea commands general approval and that work for its realization undoubtedly will continue more hopefully than in the past. For the petroleum industry, free convertibility of currencies would be particularly desirable since oil and oil products are in universal demand and since the marketing areas in which they are sold are likely to be far removed economically if not geographically from the countries of production. An international oil company obviously must deal with conditions as they exist and sell where demand prevails.

With the extension of refining facilities to many countries that formerly had to import their supplies of petroleum products from hard currency areas, the problem of obtaining many of the supplies required by their operations has been simplified by the fact that the balances which companies need to withdraw as recompense for their services have been greatly reduced. Centralization of operations within the country extending the concession by virtue of which the company is enabled to operate identifies it more closely with the nation whose resources are involved and serves to create a common bond between the two interests. This identity of interest is an important factor in promoting mutual understanding and unity.

To mitigate the difficulties arising from varying monetary values, some of the international companies have developed programs of purchasing materials and supplies in various areas where one or another, or perhaps a broad range of products, can be obtained on favorable terms. A modern oil company with operations spread half way around the globe has need for almost everything that can be catalogued, from food, drink and clothing to complex equipment and delicate instruments.

Several such accessory companies have been organized within the sterling area and in other lands where conditions are suitable. Under the spur of necessity, international shopping has been developed to a fine art by members of the oil industry.

Six month's world crude output up 4.2 percent

WORLD production of crude oil averaged 12,841,800 barrels daily in the first half of 1952, according to estimates prepared by WORLD PETROLEUM. This compares with an average of 12,336,700 b/d in 1952 and 11,790,600 b/d in 1951.

Increase in crude output of 505,100 b/d was 4.2 percent when compared with the yearly average in 1952, and 742,200 b/d or 6.2 percent when compared with the first six months of last year. The first half of 1952 is not strictly comparable with this year, however, because of the distortion in normal operations resulting from the spring strike of United States oil workers. May 1952 output was about one million barrels below either April or June. For the year as a whole, however, it may be assumed that the missing production in May was fully made up.

The increase in production is somewhat less than estimated increases in demand for petroleum products in 1953. The Supply and Demand Committee of the Independent Petroleum Association of America estimates that U. S. domestic demand will approximate 7,670,000 b/d in 1953 compared with 7,281,000 b/d in 1952, an increase of 5.3 percent. Eugene Holman, president of Standard Oil Co. (N.J.), told stockholders at the recent annual meeting of that company that world demand outside of Soviet controlled nations will rise about 6 percent in 1953. Demand outside the United States has been increasing more rapidly than domestic consumption for several years.

Indications are that operations during the first half of the year have been conducted at a rate permitting some reduction in overall stocks. In the first quarter of the year total liquid stocks in the U.S. were reduced 138 million barrels. During the second quarter, there has been a substantial reduction in the rate of domestic production and some reduction in imports of foreign oils so that overall stocks have not risen appreciably.

First half production of the U.S.S.R. and its satellite nations is estimated to have averaged 1,182,500 b/d compared with 1,104,000 b/d in 1952. The increase in communist countries thus was about 7.1 percent compared with 3.8 percent in countries this side of the iron curtain. Noncommunist nations produced 11,659,300 b/d in the first half of 1953 compared with 11,232,700 b/d in 1952.

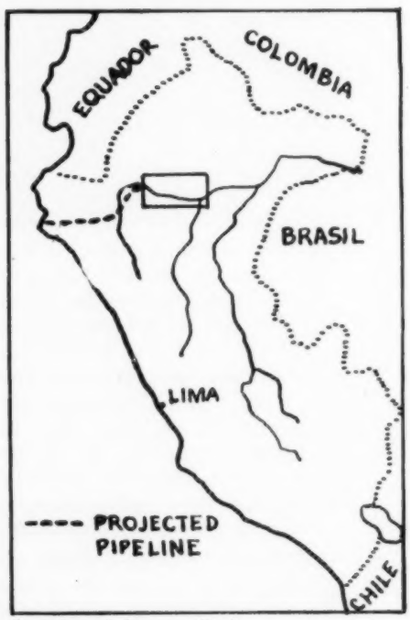
Estimates of production in Soviet controlled nations are prepared from statements at party meetings and in official documents although these may be modified in certain areas (notably in Romania) by other data. A recent estimate of interest is contained in the summer issue of the *Flying Red Horse*, house magazine of Socony-Vacuum Oil Company. The estimate is that of Dr. Leonid P. Smirnov, formerly chief arctic geologist for the Soviet Government. He believes that the U.S.S.R. produces currently about 950,000 b/d and satellite countries about 160,000 b/d. The figures used by WORLD PETROLEUM are somewhat higher, 1,010,600 b/d for Soviet Russia and 172,500 b/d for satellite nations.

No information is available regarding consumption in Soviet controlled territory, but it may be assumed that it continues in line with current output. Exports to the outside world are limited in volume, and party leaders continue to use their best efforts to stimulate the efforts of satellite states as well as technologists and field men. Dr. Smirnov points out in his article in the *Flying Red Horse* that the Russian petroleum industry is in effect operated almost solely for the military. It is only after all military requirements are met that any oil is available for the civilian economy.

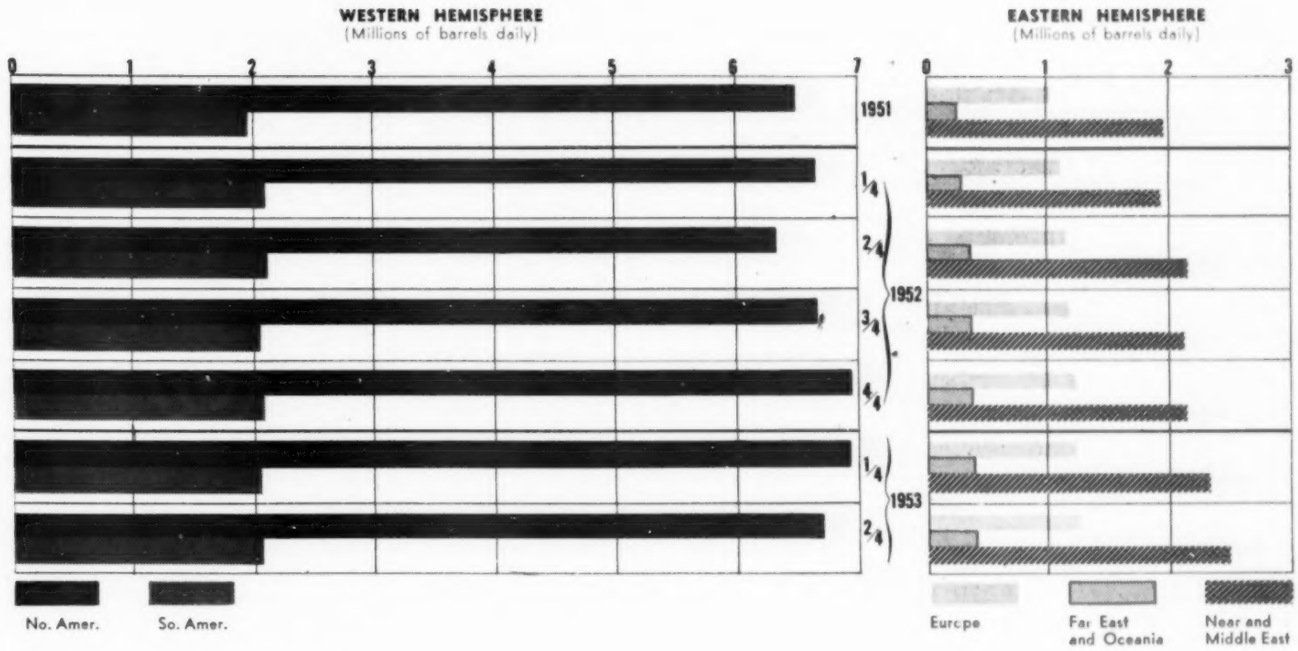
The Eastern Hemisphere as a whole continued to make rapid strides toward self-sufficiency in oil supply. If the present rate of increase is maintained during the last half of 1953, it seems likely that movement of oil from west to east in international trade may become unnecessary except in the case of special oils and to fulfill contractual obligations. In 1951 the Western Hemisphere supplied a net of 390,000 b/d to the East.

Result of the rapid increase in Eastern Hemisphere output has been to retard increases in the West. The change has borne most heavily on South America. In the first half of the year South American crude production was reduced 46,400 b/d under the 1952 average to 2,047,900 b/d, a drop of about 2.2 percent.

Venezuela bore the entire loss in South American crude production. Average output in Venezuela was about 1,744,000 b/d during the six months compared with 1,803,900 b/d in the full year 1952, a loss



Location of Amazon Basin concession in Peru applied for by Texas Petroleum Co.



in production of 59,700 b/d. For several years Venezuela, as the world's second largest producer, has supplied well over 14 percent of the global demand for crude. In 1952 the percentage was 14.6 compared with 14.5 in 1951 and 14.4 in 1950. In the first half of 1953 the percentage had declined to 13.6.

Colombia, Argentina and Trinidad, second, third and fourth largest producers of crude in South America, all increased their output in the past six months. Colombia output was up 2,500 b/d, Argentina 6,800 b/d and Trinidad 2,500 b/d.

The outlook for increased production in Colombia has brightened recently with a second Cretaceous discovery by International Petroleum Co. Ltd. in a test drilled about nine miles northwest of Totumal No. 1, its previous find. The well found the Cretaceous at 5,700 to 6,400 feet which produced 210 b/d on a quarter inch choke with 400 pounds tubing pressure. The oil is light, 35-37° API. Drilling will be continued to test the size of this new structure as well as the deeper horizon at Totumal.

In Latin America outside of Colombia, the area in which exploration activity is expected to expand most rapidly is Peru. Enlarged activity here is a result of passage of a new oil law which reduces taxes, gives a depletion allowance of 27.5 percent and extends exploration permits to cover a 10-year period.

An important step for the development of the Peruvian Amazon basin east of the Andes, the biggest oil prospect of the country, was realized recently when The Texas Petroleum Co. applied for 20 exploration concessions totalling 999,800 hectares or 2.45 million acres. The concession sought is in the northern part of the "Montana," covering the Maranon river and its tributaries from Borja to its confluence with the Huallaga river. The Maranon and the Ucayali rivers form part of the Amazon.

These concessions have the advantage of being more accessible for transporting oil to the Pacific coast since Borja is the terminal of the projected 350-mile pipe line across the Andes to Bayovar on the Pacific Ocean. The line would cross the lowest pass in the Cordillera at about 7,000 feet in the Paso de Porculla.

This is the first time a major oil company has decided to enter this region, although International Petroleum, Socony-Vacuum and Shell carried out geological and geophysical surveys for several years. The heavy expenses necessary in this forest-covered country, accessible for heavy equipment only on the Amazon River from the Atlantic, have hampered its development so far.

Other companies have also taken an interest in the Montana recently. The Ganso Azul field has been acquired for a price of around $4 million, including $1 million cash, by the Texas Gulf Producing Co. of Houston, which proposes to drill eight new wells and to construct a 48-mile pipe line to Pucallpa and transport the oil by barges to Manaos, where a refinery for 5,000 b/d has been projected by Brazilian interests. Kendall Refining Co. of Bradford, Pa. and Bay Refining Corp. of Saginaw, Mich. each have a 10 percent interest in the new enterprise.

Peruvian Oils and Minerals Ltd., a Canadian company, has applied for about a million acres of concessions, and the national El Oriente Co., which has drilled three exploration wells without success, the last one to almost 9,000 feet, has applied for new concessions.

Most spectacular change in rate of production in the Western Hemisphere is, of course, in Canada. First half output averaged about 185,000 b/d compared with 132,500 b/d in the first half of 1952, an increase of almost 40 percent. First quarter production was curtailed sharply because of the tie-up in shipping on the Great Lakes. This is the last year that the winter freeze-up will have such a drastic effect. Completion of the Interprovincial Pipe Line extension to Sarnia, Ont., will allow year-around deliveries of crude on a steady basis.

Completion of new refinery capacity on the Prairies has enabled Western Canada to expand its output greatly in recent months, well in advance of completion of the Trans Mountain Pipe Line to the Pacific Coast. In Alberta, oil buyers asked the Provincial authorities for permission to produce 223,345 b/d in June compared with 195,570 b/d in May. A year ago nominations totaled 186,260 b/d in June.

The May issue of WORLD PETROLEUM gave preliminary estimates of well completions in Canada in 1952, the estimates being based on scout reports. Since that time official figures have been released. These are given in the following tabulations:

1952 DRILLING IN WESTERN CANADA
(Official Provincial Govt. Figures)

PROVINCE	OIL	GAS	DRY	TOTAL
Northwest Territories	...	..	16	16
British Columbia	...	13	4	17
Alberta	946	38	546	1,530
Saskatchewan	210	19	226	455
Manitoba	32	..	35	67
Total Western Canada	1,188	70	827	2,085

The June Bulletin of the American Association of Petroleum Geologists reported on wildcats drilled in Canada in 1952, dividing results into "new field wildcats" as contrasted with four other classes (outposts, new pool, deeper pool, shallower pool). The data was gathered by a committee headed by Floyd K. Beach as follows:

Type	Oil	Gas & Cond.	Dry	Total
Western Canada				
New Field	64	67	555	686
Other Wildcats	80	29	105	214
Eastern Canada				
New Field	3	4	43	50
Other Wildcats	3	4	34	41
Total Canada	150	104	737	991

WORLD CRUDE OIL PRODUCTION

(Thousands of Barrels Daily)

	1939	1951	1952 First Quarter	1952 Second Quarter	1952 Third Quarter	1952 Fourth Quarter	1953 First Quarter	1953 Second Quarter
North America								
United States	3,465.7	6,149.0	6,324.0	5,911.0	6,276.0	6,546.0	6,549.0	6,250.0
Canada	19.1	130.5	120.8	163.6	193.2	190.4	166.0	204.0
Mexico	162.0	210.2	218.4	218.5	209.9	212.4	215.0	215.0
Total	3,646.8	6,489.7	6,663.2	6,293.1	6,679.1	6,949.1	6,930.0	6,669.0
South America								
Venezuela	567.0	1,704.6	1,820.0	1,832.9	1,748.5	1,814.3	1,743.4	1,745.0
Colombia	65.5	105.3	105.2	107.2	107.4	102.7	108.0	108.0
Argentina	51.0	66.9	68.0	67.1	66.4	71.2	75.0	75.0
Trinidad	52.8	57.1	55.5	56.8	58.5	58.7	59.7	60.0
Peru	37.1	44.0	45.9	46.4	44.5	45.1	46.0	46.0
Ecuador	6.3	7.4	7.7	7.6	7.4	7.9	7.8	7.8
Chile	—	2.0	2.3	2.2	2.5	2.9	3.0	3.0
Brazil	—	1.9	1.7	1.7	1.9	2.2	2.6	2.7
Bolivia	0.6	1.4	1.5	1.5	1.4	1.3	1.3	1.3
Cuba	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.1
Total	780.6	1,990.9	2,108.1	2,123.7	2,038.8	2,106.6	2,046.9	2,048.9
WESTERN HEMISPHERE	**4,427.4**	**8,480.6**	**8,771.3**	**8,416.8**	**8,717.9**	**9,055.7**	**8,976.9**	**8,717.9**
Europe								
Germany	12.3	26.5	30.6	33.5	35.1	36.4	38.0	42.0
Netherlands	—	13.6	13.9	13.8	13.8	12.8	13.0	13.0
France	1.4	5.6	6.2	6.7	6.9	6.6	6.9	7.0
Yugoslavia	—	3.2	3.2	3.2	3.2	3.2	3.0	3.0
French Morocco	—	1.6	2.1	2.3	1.9	1.9	1.9	2.0
United Kingdom	0.1	0.9	1.1	1.1	1.1	1.1	1.1	1.1
Italy	0.2	0.4	0.8	1.0	1.6	1.8	2.0	2.0
Algeria	—	0.3	0.7	0.8	0.9	1.0	1.2	1.2
Total (Excluding USSR & Satellites)	14.0	52.1	58.6	62.4	64.5	64.8	67.1	71.3
USSR	603.0	842.0	905.0	930.0	950.0	975.0	1,000.0	1,020.0
Romania	128.5	100.0	90.0	90.0	90.0	90.0	90.0	90.0
Austria	11.7	44.0	50.0	55.0	55.0	60.0	58.0	60.0
Hungary	3.0	10.5	9.5	9.5	9.5	9.5	14.0	14.0
Poland	10.7	3.7	4.0	4.0	4.0	4.0	4.0	4.0
Albania	2.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Czechoslovakia	0.2	1.9	2.5	2.5	2.5	2.5	2.5	2.5
Total USSR & Satellites	759.6	1,005.1	1,064.0	1,094.0	1,114.0	1,144.0	1,171.5	1,193.5
Total Europe	773.6	1,057.2	1,122.6	1,156.4	1,178.5	1,208.8	1,238.6	1,264.8
Near & Middle East								
Saudi Arabia	10.8	761.5	846.6	871.3	828.6	743.5	792.5	875.5
Kuwait	—	563.0	716.7	778.7	760.6	723.6	794.2	885.1
Iraq	84.5	174.6	227.8	371.8	423.0	510.9	539.0	570.0
Qatar	—	49.6	62.6	65.5	67.6	78.0	78.9	85.0
Egypt	12.8	44.7	46.0	44.6	43.4	45.8	46.0	46.0
Bahrain	20.8	30.0	30.0	30.0	30.1	30.1	30.0	30.0
Iran	214.0	350.0	30.1	29.1	27.1	24.2	25.0	25.0
Turkey	—	0.4	0.4	0.3	0.4	0.3	0.3	0.3
Total	342.9	1,973.8	1,960.2	2,191.3	2,180.8	2,186.4	2,305.9	2,516.9
Far East & Oceania								
Indonesia	170.0	151.7	153.9	168.1	173.2	188.3	192.4	212.8
British Borneo	20.0	103.0	106.3	104.9	104.8	102.0	103.0	103.0
Japan	7.3	6.4	5.8	5.8	5.9	5.7	5.9	5.9
India	**	5.3	5.2	5.4	5.6	5.8	6.0	6.0
New Guinea	—	4.8	4.6	4.6	4.8	4.8	4.9	4.9
Pakistan	*28.0	3.6	3.0	4.5	4.5	4.5	4.4	4.4
Burma	**	2.2	2.2	2.2	2.4	2.4	2.5	2.5
China	—	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total	225.3	279.0	283.0	297.5	303.2	315.5	321.1	341.5
EASTERN HEMISPHERE	**1,341.8**	**3,310.0**	**3,365.8**	**3,645.2**	**3,662.5**	**3,710.7**	**3,865.6**	**4,123.2**
WORLD TOTAL	**5,769.2**	**11,790.6**	**12,137.1**	**12,062.0**	**12,380.4**	**12,766.4**	**12,842.5**	**12,841.1**

* Includes India and Burma.
** Included in Pakistan figure.

South of the Rio Grande the current crude production of Mexico is tending to rise slightly. New discoveries are making up for the decline in output at Poza Rica and other older fields.

While the Western Hemisphere was increasing its crude production 1.2 percent in the first six months, the Eastern half of the globe enlarged its output of crude oil 11 percent compared with the average for 1952. The increase was 398,300 b/d to a total of 3,994,400 b/d. As mentioned previously, this is close to demand in the Eastern Hemisphere.

Oil producing nations in the Middle East continued to expand their operations more rapidly than in other parts of the world. Crude output of the area was up 281,700 b/d or 13.7 percent to a total of 2,411,400 b/d in the first half. This compares with an increase of 10.5 percent in the Far East and 7.3 percent in Europe (including the Soviet Zone).

Completion of the new pipe line to the Mediterranean by I.P.C. and of the line to Fao on the Persian Gulf by Basrah Petroleum Co. has had a profound effect on the output of crude oil from Iraq. Daily average in the first half of 1953 was 555,000 b/d compared with 300,000 b/d in the first half of 1952 and 383,000 b/d for the entire previous year.

Production in Saudi Arabia has leveled off. First half output averaged about 834,000 b/d compared with 822,500 b/d in 1952. The increase was only 11,500 b/d. In contrast, Kuwait output still is on the rise. Production this year has averaged 839,700 b/d compared with 752,400 b/d in 1952. The increase here has supplied much of the oil needed by Anglo-Iranian Oil Co., supplies which formerly came from Persia. With the British-Iranian controversy still unsettled, the crude production by that country continues to lag at perhaps 25,000 b/d.

Elsewhere in this issue is an article dealing with the Qatar peninsula which now is producing around 85,000 b/d of crude. Last year the average was 68,400 b/d.

In Oceania and the Far East, producing operations generally are on a routine basis. Outstanding exception to this is in Indonesia, where the Minas field was opened to production a year ago. Output of this field has been instrumental in bringing the average production in Indonesia up to 202,600 b/d in the past six months compared with 170,900 b/d in 1952.

Records of the year to date make it clear that the Eastern Hemisphere need no longer look to the Americas for oil in substantial quantities. With that market lost to American exporters, the peacetime problem of the western industry centers largely on the necessity of balancing supply and demand in such a way that a healthy industry is maintained and a sufficient back-log of producing capacity built up to supply emergency demands. It is a juggling act which requires no little skill.

Government says "yes" and "no" to international companies

By Joseph Huttlinger

WASHINGTON

EARLY in June, 14 American oil companies with foreign interests were asked by Arthur S. Flemming, defense mobilization director, to participate in a new voluntary agreement for the supply of petroleum to friendly foreign nations. Elsewhere some of the same international companies are being sued by the government for alleged collaboration and for charging too much money for oil delivered to foreign nations.

The industry is in much the same position today as the daughter who was advised that, yes, she could go swimming—"just hang your clothes on a hickory limb, but don't go near the water."

The government is giving the same kind of "yes" and "no" counsel to American companies operating overseas. Go ahead and produce foreign oil, the government has been saying for years; but antitrust actions may result and the Congress may try to close American markets to such oil. The new voluntary agreement is the latest development in this situation.

The agreement was drafted in the Interior Department, and cleared by top officials in government, including Attorney General Herbert Brownell, Jr. Under it, the government promises immunity under the antitrust laws for oil companies abroad, if they get together to pool information on foreign supply and demand and stocks, and send it on to the federal government.

Interior's Petroleum Administration for Defense, which has the duty of gathering information on petroleum supply and demand at home and abroad to make sure there is enough for the defense effort, urged the agreement. Actually, the Defense Department needs the information as much as any government agency, and ardently supports PAD desires in this matter. To get the information, the PAD says the chief reliance must be upon oil companies operating abroad, and for the companies to gather and evaluate the data, the PAD says, they must get together around a table. For this, the PAD goes on, a special exemption from the antitrust laws is needed. Authority for this exemption, for activities connected with the defense effort, is outlined in the Defense Production Act, enacted shortly after the start of the Korean war.

The agreement would be used only for the collection of factual information and the analysis of it, but it provides certain steps in addition, if needed, and if specifically approved by government. One is for the 14 companies who are members of the agreement at the start to draw up plans of action, if needed to meet any shortages that may occur, and, further, detailed schedules to carry out such plans of action.

The new agreement emphasizes that action is to be taken upon request of the government, an emphasis that was not in the earlier agreement signed in June 1951. A new wording might conceivably permit American companies abroad to get together to restrict oil imports to the U.S., which are still bringing widespread complaints from domestic producers, although a few anticipate now that the agreement will be so used as to combat surplus of oil as well as shortage.

The government's green light for the agreement strikes a note of irony. The five major companies in the agreement are also targets of two government civil actions, one charging a conspiracy in violation of the antitrust laws, the other seeking a refund of $67 million in government payments for foreign aid program petroleum supplies. Attorney General James P. McGranery, who served with President Truman, recognized the contradiction between antitrust immunity and antitrust prosecution being handed oil companies at the same time. As he filed the two actions, he moved to end an earlier voluntary agreement. He failed to achieve this, however. The earlier agreement, put into effect after the shutdown at Abadan, continued until the spring of this year, when it was ended by defense officials.

Commenting on the twin drives of government, Donald C. O'Hara, associate counsel of the National Petroleum Association, says: "The Department of Justice is actively pressing its antitrust case against the alleged 'oil cartel' and it hesitates to have the government recognize the fact that the international petroleum companies have taken any cooperative actions at the request of the government."

Developments in the civil antitrust action brought a court order in June transferring the action from the Washington, D. C. federal court to the Southern District of New York, a transfer asked by the oil companies involved. The government agreed, explaining this would speed things, as arguments over where to hold the trial might take months. To be determined, as July came, was exactly what records the defendants are to furnish the government. The overcharge suit, also in the Southern District of New York, is regarded as intimately linked with the 'cartel' action, although separate for legal purposes.

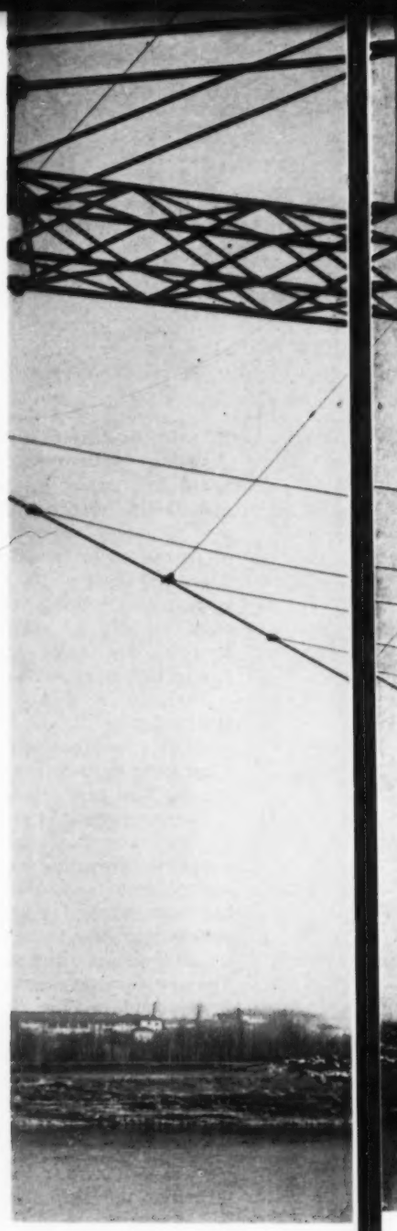
The coming of President Eisenhower and a new cabinet to the White House, once expected to bring a speedy dismissal of both actions, instead brought merely a change in the form of the 'cartel' case. The criminal charges were replaced by civil.

The Eisenhower administration, while it adopted the Truman crackdown on foreign oil companies, is getting ready to discharge the man responsible for starting it—Stephen Spingarn of the Federal Trade Commission. His term is up in September, and he is not to be reappointed.

A large segment of the federal government has given widespread praise to foreign operations of oil companies abroad as, among other things, the outstanding example of American industry going abroad to do good economically for less developed areas. In fact, under a law voted by the Congress, the government has issued guarantees to some oil operations abroad against expropriation and certain other losses, to encourage the companies to go abroad. A House Foreign Affairs committee report in June emphasizes the good work being done abroad by oil companies.

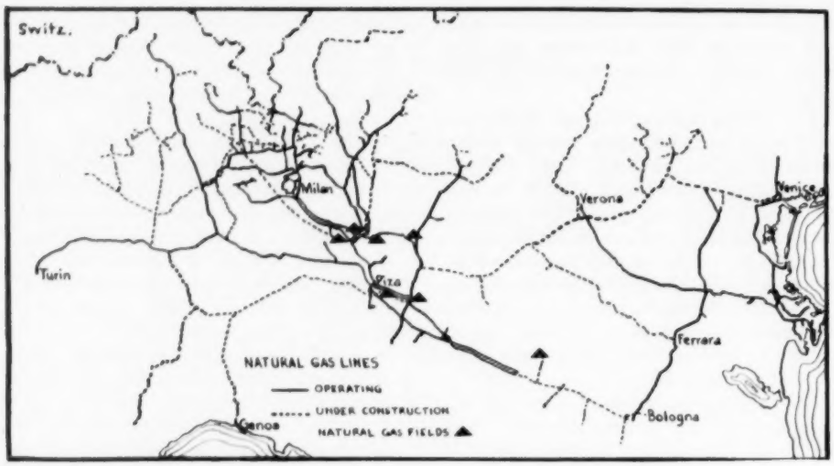
In the face of this, another large segment in Washington, chiefly located in the U. S. Congress, continues to fight against "excessive oil imports," and threatens legislation to limit the flow to 728,000 barrels daily, instead of more than a million barrels today. While the oil quota will not be enacted this year, the controversy is leaving a fear in its wake that at some future time the U. S. may take action to limit oil imports. In fact, a plan for a compromise solution, including worldwide proration in some form or other, is now winning increasing attention.

The silver lining in the situation lies in the assurance that Attorney General Brownell recognizes the foolishness of the situation whereby the government tells companies to go swimming but not to get wet. Intimates of the Attorney General express a belief that he is forming a clear cut policy not only toward foreign oil, but toward all foreign operations of American companies. Just how far the Attorney General is to go is to be seen, but he is studying an idea of P. C. Spencer, reported in the June issue of this magazine, for a "revision and restatement" of the antitrust laws to meet modern day realities. Since the government's attitude toward foreign oil is probably as mixed up today as it can be, the prospects are that it will get better rather than worse.



One of several gas line crossings of the Ticino river, necessary in building the new distributing system. This crossing is on the Cortemaggiore-Turin line.

Gas pipe lines are being laid to many new areas in northern Italy.



Italian natural gas industry expands

By Alberto Girelli*

Manual method of handling pipe on an Italian gas line.

THOUGH natural gas has been known in Italy since the time of the ancient Romans, practical utilization is rather recent. Utilization on a commercial scale started around 1930, but for about 15 years use was mainly limited to substitute motor fuel and for local consumption near producing wells.

The limitation of gasoline supply during World War II hit Italy heavily, and greatly contributed to the efforts to find more and more natural gas resources. During the war hundreds of shallow wells were drilled (from 100 to 1,500 feet) in the Po river delta region, Polesine, where gas consisting almost entirely of methane was recovered, mixed with salt water. Some wells were also drilled in the small known fields in the Appenine zone of the Emilia and Tuscany regions. Private companies carried out the work, and the first gas lines were built to carry gas to Florence, Padua, and Parma. At about the same time, the government-owned company AGIP discovered the gas and oil fields of Podenzano (Piacenza) and Fontevibo (Parma), about 2,400-3,000 feet depth, from which gas flowed under a pressure of some hundreds of pounds.

The Podenzano field was connected to Milan through a pipeline 38 miles long. This line served compressor stations for delivery of compressed gas for automotive use. During its life this field produced seven billion cubic feet of gas.

During the first two war years, the AGIP, using modern prospecting methods, among which seismic reflection showed itself as the most fruitful, found a very rich

**Stazione Sperimentale per i Combustibili, Milan, Italy. The main data reported in the present article are from a lecture given by Prof. C. Padovani before the French Association of Gas Industry, Paris.*

gas field at Caviaga, 20 miles southeast of Milan. This discovery, at a depth of about 4,000 feet, marked a very important step in the history of the Italian natural gas industry, as it showed the existence of productive strata in the upper Miocene, and encouraged research in other regions of the Po river plains having similar characteristics. However, owing to war difficulties, the Caviaga field could not be fully developed and exploited before the war ended.

Seismic work has been extended since the war, and a number of producing strata have been discovered, mainly in the upper Pliocene (fields of Bordolano, Cornegliano, Correggio, Ripalta, and Cortemaggiore), all in the center of the Po plains, and in the territories of the provinces of Milan, Cremona, Parma, Piacenza, and Reggio. Ripalta and Cortemaggiore fields yielded gas very rich in higher hydrocarbons and natural gasoline. Other reservoirs have been found also in such geologic formations as the middle and lower Miocene and the Pliocene.

The most recent discovery (January 1953) is a highly productive stratum at Imola, southeast of Bologna, about 100 miles from the actual center of production, where gas has been found at 5,000 feet under high pressure. Production tests showed a capacity of 10 million cubic feet daily.

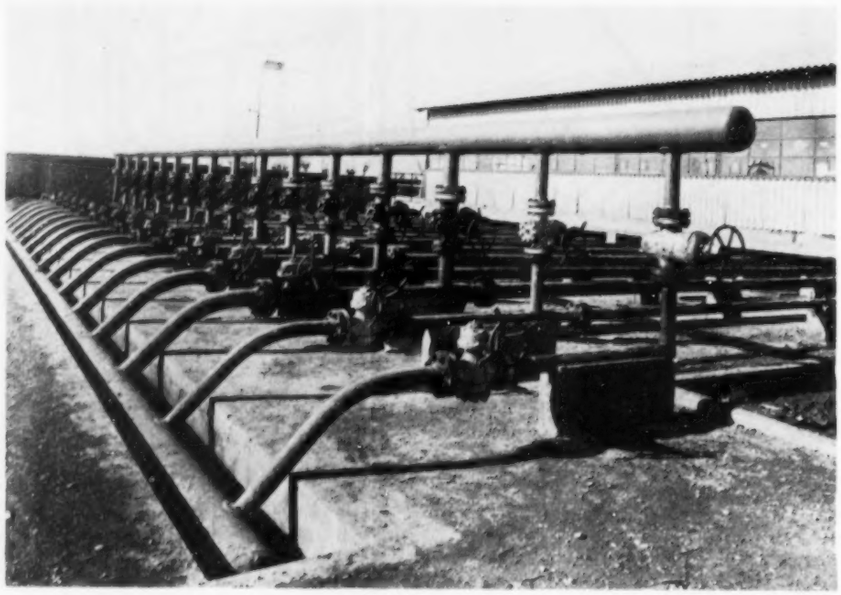
A gasoline absorption plant with a daily capacity about 100 million cubic feet and a yield of 200 tons of high octane motor gasoline, 130 tons LPG, plus minor quantities of heavier products, has been built at Cortemaggiore for AGIP by J. F. Pritchard and Co. It has been operating a year.

Oil has also been found close to the gas field, at a deeper level (12,000 feet). Actual production is around 1,000 b/d. A definite forecast cannot yet be made, but there are good prospects for finding more oil in the region.

The overall capacity of gas reservoirs reached by the AGIP is at present evaluated at more than 2,000 billion cubic feet, which at a yearly consumption of 100 billion (which figure is well above the actual consumption rate) will assure 20 years of supply. The potential production, as of midyear 1952, for the main fields exploited by AGIP is distributed as follows:

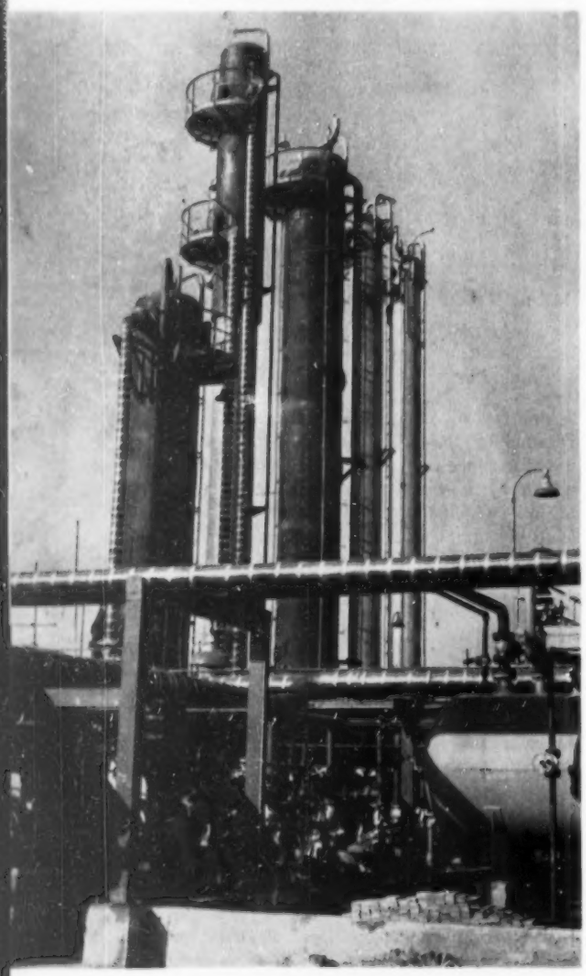
Gas Field	Daily Potential Production (Million Cu. Feet)
Cortemaggiore	100
Caviaga	65
Ripalta	50
Bordolano	50
Correggio	40
Cornegliano	25

The actual production is limited by the existing transport facilities—a maximum of about 180 million cubic feet daily. Compared to the production from the middle Po plains, the production from other re-



Manifold at the Cortemaggiore pipe line terminal. The Cortemaggiore field has the largest potential of any thus far found in Italy.

Natural gasoline plant erected to process gas from the Cortemaggiore field.



gions is of a minor importance The shallow strata of the Polesine region are still producing, and the plants heavily damaged by November 1951 floods have been completely repaired. Cost of production there is much higher than that of the AGIP fields. Daily production now averages 30 million cubic feet. Polesine region gas comes out of about 1,500 small wells, and the gas is mixed almost everywhere with salt water, which poses problems of contamination of cultivated soils.

A pipe line system, operated by Azienda Metanodotti Padani (AMP), also controlled by AGIP, connects the producing area to towns and industries mainly in the Veneto region (Padua, Venice, Verona, etc.). This distribution system is connected with the AGIP-SNaM system.

Some other producing wells are scattered here and there over the rest of Italy and in Sicily. However, they represent now only a minor portion of the Italian oil and gas industry. The AGIP-SNaM pipe line network is at present developed to an overall length of 1,200 miles, and a program is under way to bring it to 3,100 miles. Actual transportation capacity will then reach 710 million cubic feet daily.

Natural gas production in 1952 from the AGIP fields in North Italy reached the record figure of 41 billion cubic feet (compared with 34 billion cubic feet in 1951). Production is still increasing, and in January 1953 the average was around 245 million cubic feet daily. In 1953 AGIP has been operating 17 drilling rigs and using six contracted rigs. Seventy-six wells have been completed for an overall footage of 420,000 feet.

Three new gas fields were discovered in 1952: Correggio, in the Po valley; and Ravenna and Rapagnano, in central Italy south of Ancona.

The main use of natural gas is at the present as industrial fuel. Industrial users take 82 percent of total gas distributed. Metallurgical industries lead with 25 percent of the whole consumption, and textile and chemical industries follow with 15 percent each. Other natural gas consumers are the glass, ceramic, paper, food, building materials, and electrical industries. The use of natural gas as motor fuel, though expanding on an absolute volume basis, is becoming of less importance on a percentage basis. In 1944 about 80 percent of production went to motor fuel, and at present only 10 percent. Natural gas use is expanding in the electric industry and for domestic and commercial heating. Gas is aiding the hydroelectric potential of Italy, which is exploited at a maximum and cannot be increased except at excessive cost through the building of dams and power stations in more and more inaccessible regions of the Alps. Two electric power stations built recently and now in operation near Milan and at Piacenza are generating one billion kwh yearly with a consumption of 10-12 billion cubic feet per year of natural gas, while other existing plants have undergone proper arrangement to run on a dual fuel basis.

The use of gas as domestic and commercial heating fuel, after some delays caused by conflicting interests of natural gas and manufactured gas producers, is expected to be more and more important. Some towns now are fed with straight natural gas, while others use straight or reformed natural gas mixed with coal gas. How the public feels about the substitution of natural gas for coal gas can be seen by the example of Lodi (a town of some 25,000 people, 17 miles southeast of Milan). Substitution of natural gas for manufactured gas started in 1951. In a few months the consumption by volume multiplied by four, and the consumption by Btu multiplied by ten.

The use of natural gas for chemicals is just starting in Italy. A nitrogen fertilizer plant using natural gas as a raw material began operating in December 1952 at Novara under the Montecatini Co., and 45,000 metric tons yearly of ammonium nitrate, 35,000 of ammonium sulfate, and minor quantities of urea and other nitrogen compounds will be produced. Another large fertilizer plant, also owned by the Montecatini Co., is starting operations at Ferrara. Projects are under way for the construction of plants utilizing natural gas for methanol, hydrogen cyanide, and carbon sulfide production.

Natural gas is playing a major role in the industrial development of Italy, a development which has previously been handicapped by the necessity of importing fuel, or of using more expensive sources of energy.

Tidelands drilling costs reported by N. P. C.

By Joseph Huttlinger

A 10-MONTH study by the National Petroleum Council has come up with an estimate that it will cost two or three times as much to find and produce petroleum in the offshore, submerged lands as it does to conduct onshore petroleum operations.

The report was submitted to Secretary of the Interior Douglas McKay by L. S. Wescoat, president of the Pure Oil Co., who was chairman of the council's committee making the tidelands study. The estimate stated that, "some elements of the cost of operations over the water will be 10 times as high, and overall, the cost will be at least twice as much and maybe much more."

The report is timely, as the Congress is completing legislation which may touch off a sharp upward trend in activity both off the coast of California and in the Gulf of Mexico. The Congress has completed, and the President has signed, legislation giving the coastal states title to the offshore lands out to their historic boundaries. Still pending is legislation setting out leasing provisions for the outer belt of the offshore submerged lands.

Assuming the legislation is completed, that adequate incentives are available, and that California removes her law barring drilling platforms on the coastal seas, an upsurge in offshore drilling may be expected, the report said.

The economic factor, however, will limit operations, at least in the near future, to water depths of 50 feet off the California shore, and 60 feet in the Gulf of Mexico, the report pointed out. This means only some 300 square miles off the California coast, and 14,000 square miles off the Gulf Coast would be tapped for oil, out of a total area in the continental shelf of 278,000 square miles.

What kind of results may be expected? The council estimated that under these assumptions, a production of 170,000 to 200,000 barrels daily of additional production may be expected within five years. At present, less than 20,000 barrels daily is being produced in the offshore lands. Of the new total, some 70,000 to 100,000 barrels daily would come from Gulf Coast operations, and the remainder from the West Coast. In addition, some 600 to 800 million cubic feet daily of natural gas may be expected.

After five years, "when the basement has been laid," oil production should pick up briskly, the report said, explaining:

"The major contribution of the submerged offshore area to the nation's supplies of oil and gas will come beyond the five year period . . . because of additional development on discovered fields, improved techniques, and later discovery and development resulting from continued exploration."

Of the cost of operations off the coast of California, the report gave this outlook:

"It has been conservatively estimated that, under present conditions, it will cost four to ten times as much to prepare for drilling an average well at sea as compared to an average well on land."

In actual dollars, the report gave this estimate of the costs of offshore drilling along the California coast in 50 feet of water:

BASIC EQUIPMENT COST

	Development	Exploratory
Platform or Island	$1,500,000	$ 400,000
Drilling Equipment	500,000	500,000
Special Equipment	100,000	100,000
Marine Vessels	280,000	280,000
Shore Base	50,000	50,000
Communications	30,000	30,000
	$2,460,000	$1,360,000

OPERATION (DRILLING) COST
(10,000-foot well)

	Development	Exploratory
Drilling (120 days)	$600,000	$480,000
Marine Cost	120,000	100,000
	$720,000	$580,000

TOTAL COST PER WELL
(10 Wells—10,000 feet)

	Development	Exploratory
Operation	$720,000	$580,000
Amortization	246,000	136,000
	$966,000	$716,000

(One Well—10,000 feet)

Operation	$ 580,000
Amortization (Equipment)	96,000
Amortization (Platform)	400,000
	$1,076,000

(5 Wells—10,000 feet plug and redrill)

Operating	580,000
Amortization (Equipment)	96,000
Amortization (Platform)	80,000
	$ 756,000

With costs of this magnitude, the Wescoat report pointed out, any production of less than 1,000 barrels per day, which must be carried by barge more than 10 or 15 miles, would be considered uneconomic.

Costs of a 20-well program on a Gulf Coast offshore structure in 60 feet of water also were given by the committee. In this case the committee set out the cost of onshore facilities as well as the offshore costs involved in the project. The data follows:

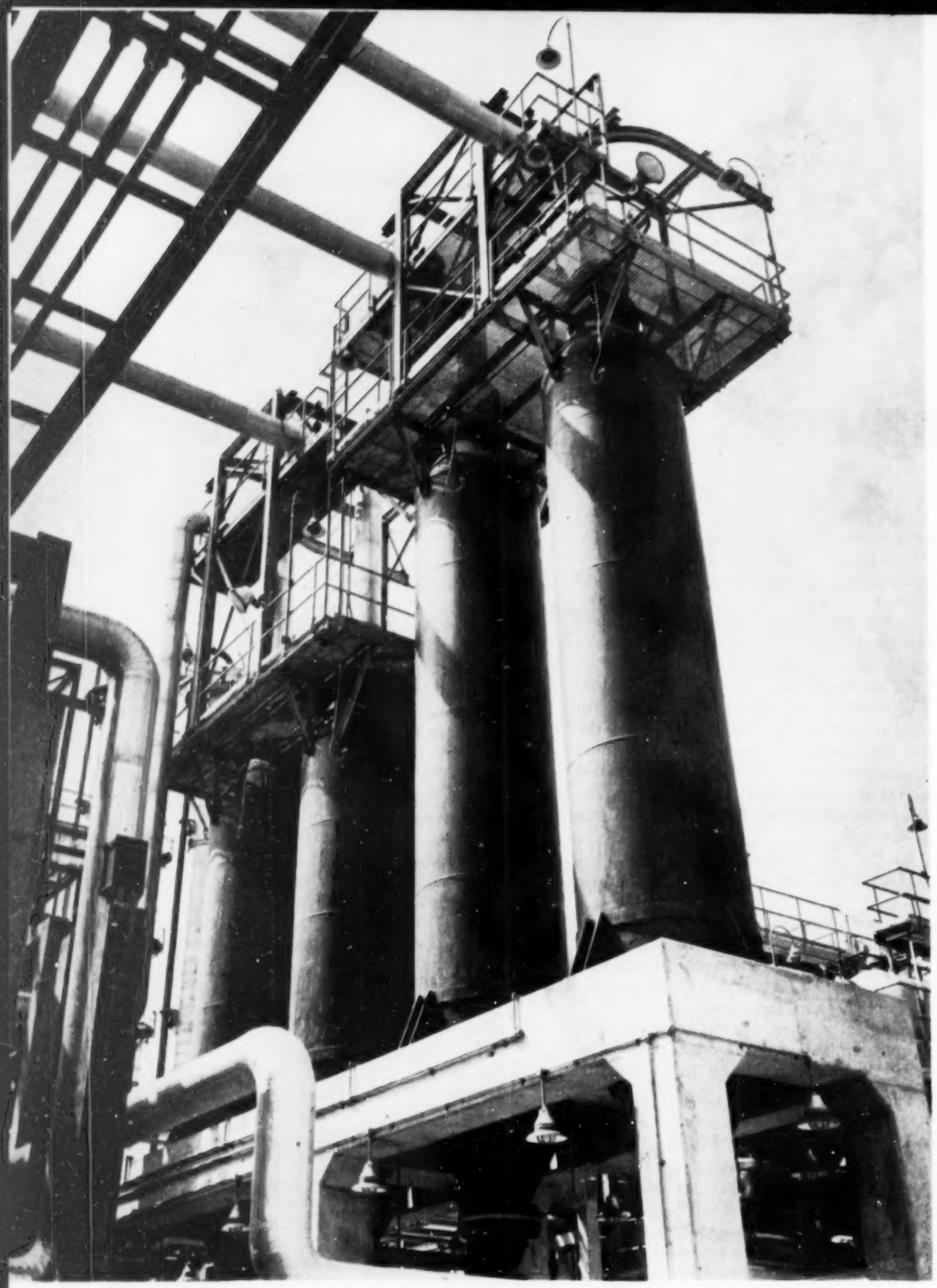
Drilling Costs	Offshore	Land
Base of operation (expansion)	$ 250,000	$ 80,000
Platforms		
4 Platforms in 60 feet water	1,200,000	200,000
Drilling		
5— 8,000 foot wells	2,090,000	500,000
5—10,000 foot wells	2,640,000	800,000
5—12,000 foot wells	3,210,000	1,300,000
5—14,000 foot wells	4,655,000	2,100,000
Total	$14,045,000	$4,980,000

Production Costs	Offshore	Land
Flow lines	$ 105,000	$118,000
Production equipment	287,000	63,000
Housing and warehouse	375,000	50,000
Pipe line to shore (30 miles)	1,920,000	.....
Tank battery	250,000	300,000
Transportation equipment	450,000	25,000
Roads	.....	200,000
Salt water disposal	.....	750,000
Total	$3,387,000	$906,000

The answer to the huge costs, the report points out, seems to lie in high volume operations.

"Their goal is to develop large reserves of oil and gas at unit costs that are comparable to those on land," the document explains in referring to prospective offshore operations.

"Most of them believe that this goal can be realized if offshore operations are conducted on a large scale and all facilities and equipment are fully utilized. If this is the case, it will be a noteworthy achievement that will benefit the industrial economy of the United States for many years."



Reactors of the Shell Oil Company Platforming unit at Houston, Texas.

AROMATICS

DEVELOPMENT of the oil refining industry since the close of World War II has been featured by rapid expansion of crude capacity to meet sharply increased demand, development of new processes to improve quality of conventional products and a vast expansion of petrochemical manufacturing facilities. Mushrooming of all three phases of the refining industry has been profoundly affected by military requirements for defense. Of perhaps secondary importance has been the phenomenal growth of the plastics and synthetic fiber industries with their insatiable appetites for petrochemical intermediates such as benzene, xylenes, phenol, ethylene derivatives and the higher alcohols, and the utter inability of the coal tar industry to expand its operations sufficiently to supply the demand for aromatics.

Following the outbreak of hostilities in Korea, a study group prepared an estimate of future demands for aromatics required for defense as well as normal civilian uses for a period extending through 1955. For 1953, for example, it was estimated that benzene demand under a normal economy would approximate 262 million gallons and under full mobilization 338 million gallons. At the time the estimate was prepared, the national capacity was 215 million gallons per year. On the basis of the projected demand, the Defense Production Administration asked the coal tar and oil industries to enlarge capacity by January 1, 1955 to 375 million gallons yearly, an increase of 75 percent.

At the time the committee did its work in 1950, the production of petroleum-derived benzene was very small, averaging only about 27,000 gallons daily. Early work in catalytic reforming and extractive distillation had suggested, however, that petroleum could carry a fairly large share of the load.

The oil refining industry, as it has so many times in the past, has done an astonishing job in the past three years with the result that demand for benzene and other aromatics undoubtedly will be met fully, this in the face of an increase in

Night view of the largest Platforming unit thus far constructed, the Shell Oil Company 16,000-barrel unit at Houston.

Platinum catalyst employed in the Platforming process. Photo courtesy Standard Oil Co. of California.

SHORTAGE ENDED

demand even greater than was visualized by the 1950 study group. In 1952 the oil industry produced around 35 million gallons of benzene, and this year petroleum will yield 105 million gallons. Actual output in the first two months of the year was 14 million gallons. By 1955 petroleum may produce in excess of 145 million gallons, more than the entire production of the coal tar industry in the United States before World War II.

On January 1, 1951, the annual capacity of petroleum benzene was 11 million gallons. At the beginning of 1952 this had increased almost threefold to 35 million gallons, and last January capacity had nearly doubled again to 60 million gallons. Indications are that by the end of 1953 capacity will be 130 million gallons.

C. E. Davis, associate deputy director of the Petroleum Administration for Defense, told the National Petroleum Council May 28 that the full goals and then some have been subscribed by the petroleum industry. He said that firm plans now are to build 8,456 barrels daily of new capacity by January of 1954 and that capacity will be up to 9,016 b/d a year after that.

The toluene program, Mr. Davis said, was to add 102 million gallons a year of new capacity, and this "will be exceeded by 50 million gallons a year."

As for toluene, the bulk of which comes from the petroleum industry, the expansion goal is being surpassed by about 65 percent, under present firm plans.

The January 1951 production capacity was 83 million gallons, and the expansion goal was to add 102 million gallons annual capacity for a total of 185 million gallons by 1955.

Actually, firm plans of the industry now bring the total capacity to 193,430,200 gallons a year, and a recent review of the situation by the PAD for WORLD PETROLEUM shows that an annual capacity of 248 million gallons total is in sight by the deadline. Of this, some 165 is new capacity from the petroleum industry.

By years, the petroleum industry added 52 million gallons of capacity in 1952, is to add 82 million in 1953, and 31 million in 1954 and 1955.

Just what the demands will be for benzene and toluene is not stated in exact figures by government officials. At NPA, one official said the expansion goals seem to be estimates of demands of the civilian economy and a partial mobilization for the two commodities. On the other hand, for toluene in particular, there may be a demand surpassing the estimates of the expansion goals, says PAD. Right now, and in the future, toluene is useful for extending supplies of alkylate in the production of aviation gasoline.

The PAD announced last April that it was halting the recommending of tax certificates for new benzene facilities, but it is still recommending certificates for toluene expansion. In the event a toluene expansion plant is to turn out benzene as well, the PAD will recommend the plant.

The government announced no expansion goal for xylene. PAD says this is used in premium gasoline, but not in avgas.

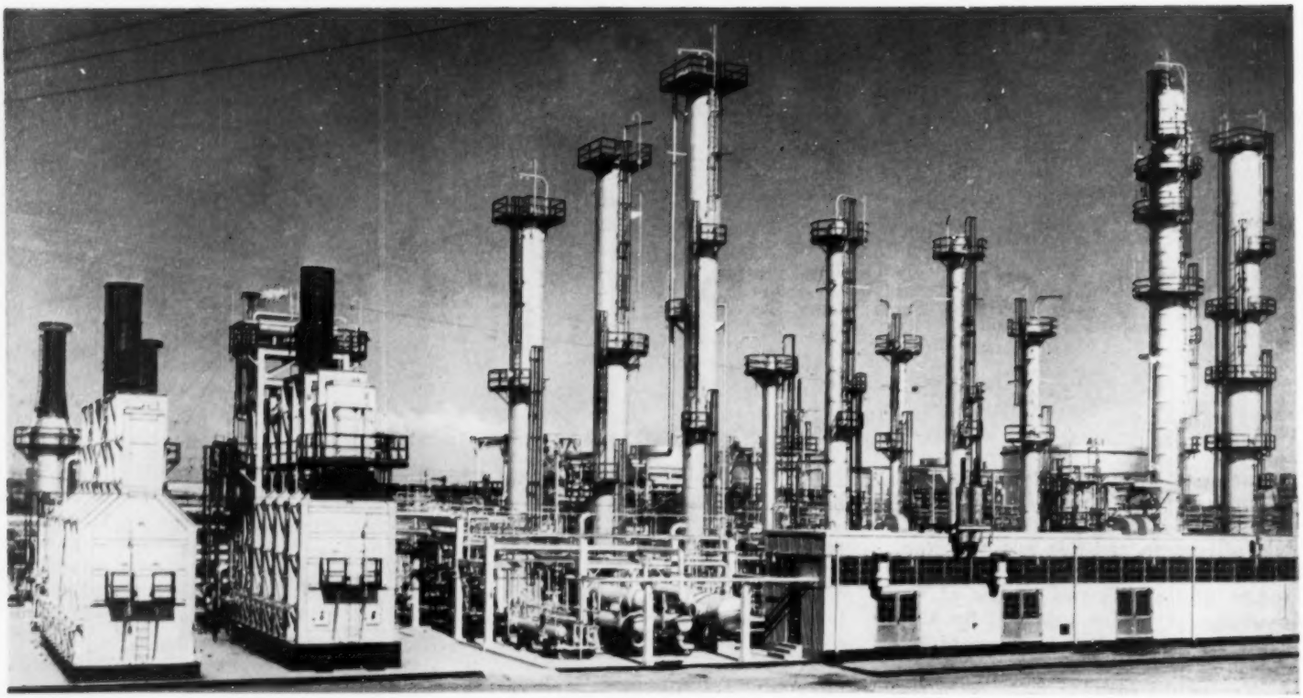
Refinery researchers have been preoccupied during the post-war period with studies of catalysis as a means of producing chemical intermediates from reactive fractions as well as with the older problem of improving octane ratings. Both objectives were achieved in a single process with the announcement four years ago this spring that Universal Oil Products Company laboratories had developed a platinum catalyst capable of improving low octane naphthas for motor fuel, producing aviation base stock and aromatic hydrocarbons.

Perfection of the catalytic reforming process was most timely in that the UOP announcement before a meeting of the Western Petroleum Refiners Association came at a time when smaller refiners were having great difficulty in meeting motor fuel quality competition by the addition of TEL to their products. Result was that a commercial unit was ordered immediately and the first Platforming unit was on stream less than six months after pilot plant results were made public.

Today there are 22 units of the Platforming process operating with a naphtha charging capacity of 80,353 barrels daily. Contracts have been placed for 36 additional units with a design charging capacity of 229,800 b/d. Operating units range in design capacity from 900 barrels per stream day to an installation of 16,000 b/d. The 36 licensed units will have design capacities of from 600 to 29,000 b/d. Platformers are now operating in eight states and two foreign countries, while those in design or construction stages will be in 10 states and eight foreign countries.

Spurred by the success of the process, other researchers have accelerated their investigative work. As a result, a wartime fixed-bed reforming process has been revamped to employ the fluid bed principle, and two refiners have developed platinum catalyst processes of their own, making a total of four processes in which platinum is employed. A commercial unit of one of these is operating successfully and other units are being built. One moving bed process has passed the pilot plant development stage and commercial units are under construction. This makes a total of six processes for catalytic reforming available to the industry. At the moment only Standard of New Jersey's Hydroforming and the Catforming process of Atlantic Refining Company are in commercial operation, but Houdry, Socony and Sinclair are busy designing or building plants.

Most recent addition to the tools available to the industry for production of nitration grade aromatics is the Platreater developed by UOP to handle special stocks rich in aromatics, but also containing olefins. First commercial unit has been installed by Roosevelt Oil and Refining Corp. at Mount Pleasant, Mich. to treat a product obtained from nearby petrochemical plants. Roosevelt also operates a Platformer and a Udex unit. The Platreater is not applicable in the average refinery, but will find use in those refineries where special petrochemical processing units such as ethylene crackers produce mixtures of unsaturates and aromatics. The treater in effect reverses one of the important reactions in the Platforming process and uses the same catalyst to achieve the re-



First combination Platforming and aromatics recovery plant was placed in operation by Cosden Petroleum Corp., Big Spring, Texas, in September 1952.

sults desired. In Platforming there are six major reactions, dehydrogenation of naphthenes to aromatics being probably the most important. In Platreating the major reaction is the hydrogenation of unsaturates, chiefly olefins, to paraffins. Elimination of the unsaturates facilitates the operation of the Roosevelt Udex unit in the production of nitration grade aromatics.

Like its neighbor, Old Dutch, Roosevelt needs the catalytic reformer to produce competitive grades of motor fuel under today's marketing conditions. The company's Platformer runs for half the month on motor fuel production at a design capacity of 1,800 b/sd. The other half of the month is used for aromatics production, for which the Platformer is scheduled to charge 1,200 b/sd of feed stock, turning out in excess of 400 b/sd of aromatics. In addition, the Platreater's daily output is 250 barrels of aromatics.

Roosevelt's new three-unit combination places the refinery in the position of being able to produce a larger quantity of premium quality gasoline, manufacture aromatics which meet nitration grade specifications and to broaden its market for specialty naphthas and solvents, which for years have been the mainstay of its business.

The refinery buys aromatic distillates from chemical companies — concentrates which previously it had been unable to refine to recover pure benzene and toluene, but which it used as a motor gasoline component.

Michigan crudes processed by Roosevelt contain a low percentage of naphthenes. The total amount of benzene and toluene which the Platformer alone with the Udex plant could have produced from these crudes was estimated at 180 barrels per calendar day. Of this amount, 140 b/d would have been toluene.

The aromatic distillates—a by-product of ethylene production by high severity thermal cracking — contain recoverable benzene and toluene estimated at about 250 b/d. But they also contain a wide variety of unsaturates, chiefly olefins, which make up 38 percent of the concentrates. Hydrogenation of the olefins and destruction of sulfur compounds facilitates operation of the Udex unit for high quality aromatic products.

Excess hydrogen from the Platformer, produced either in the motor fuel or aromatics runs, is cycled through the Platreater to saturate the olefins into paraffins before charging to the Udex unit. The constant supply of hydrogen enables the Platreater to be run continuously.

The distillates used in the Platreater are delivered to Roosevelt by truck, then pumped from storage to a prefractionator. Here a sidecut which constitutes the Platreater charge is made. The sidecut is mixed directly with a gas stream and then preheated through heat exchangers, from whence the combined feed enters a catalytic reactor where contact is made with the Platreater catalyst.

After passing through the reactor, the product is sent to a cooler, then to a separator. The liquid from the separator is charged to a stabilizer column, where the stock is stabilized to C_5 and heavier bottoms. The bottoms are sent to the Udex charge tanks, which also contain the product of the Platformer's benzene-toluene operation. These two products combine to create feed stock for the Udex unit.

Feed stock from the Udex charge tanks is pumped into an extractor, where it is contacted with the solvent which contains diethylene glycol, which removes aromatics from the feed stock. Non-aromatic raffinate from the Udex plant passes out of the extractor through a water wash to storage.

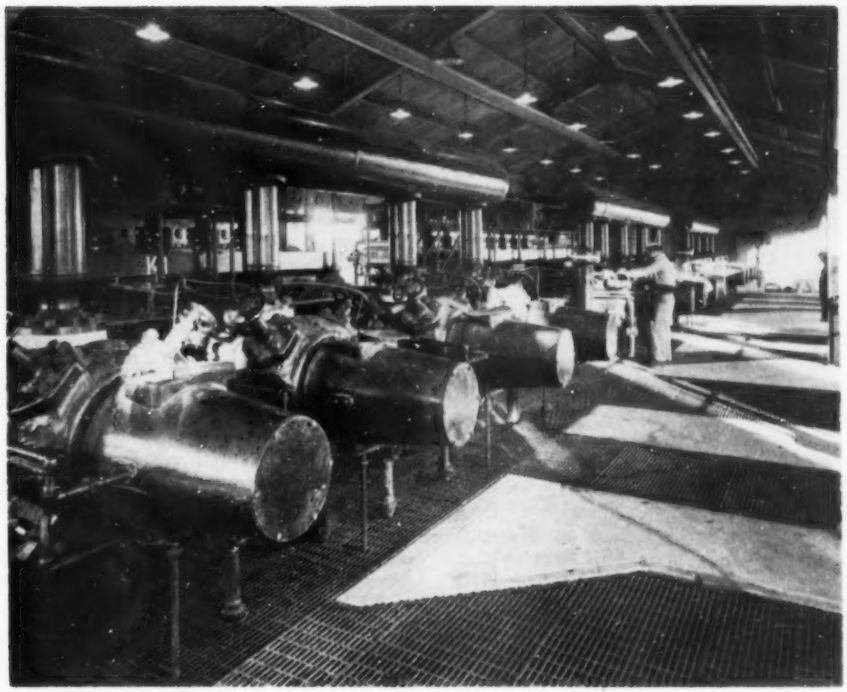
Solvent containing extracted aromatics passes into a solvent stripping column, where aromatics are recovered. In subsequent operations, the aromatics pass through a water wash and a clay treater before going into intermediate tankage.

Feed stock for the benzene-toluene fractionators is pumped from the intermediate storage into the benzene column, where benzene is taken as an overhead product. Bottoms from the benzene column pass into the toluene column for recovery of this aromatic as overhead product.

Platformer feed stock for the benzene-toluene operation has a boiling range of about 150 to 225°F. For the motor fuel operation, materials of a boiling range of 225 to 400°F. are used.

Roosevelt is processing 7,000 barrels of Michigan crude a day. In the motor fuel operations, a stabilized Platformate having a leaded F-1 octane number of 92 to 94 is being produced.

Roosevelt is experiencing an increasing demand from the solvent industry for



Hydrogen compressors at the Standard Oil Co. of California Platformer at El Segundo, Calif. This plant is to manufacture phenol as one end product.

aromatic-free naphthas. The refinery therefore plans to supply the non-aromatic residue from the Udex plant to the trade as a specialty product, thus adding to its present line of special solvents.

Procon Inc. handled the construction of all three new Roosevelt units, and participated in the preparation of drawings for erection of the units. Franklin Supply Co. of Chicago contracted to furnish all equipment. Ground was broken October 23, 1951. All foundations were placed on piles because that part of the refinery is built on a seven-foot dirt fill. Roosevelt employees erected a portion of the new facilities located in the existing refinery. Due to labor trouble in the shops of firms supplying large equipment, delays were encountered which prolonged the construction period.

The units started up immediately after construction was completed. The Platformer went on stream January 8, 1953, on a run to produce benzene and toluene; the Platreater went on stream January 12 and the Udex unit on January 20. Since the first day of operation, no materials were sent to "off specification" tanks.

In the first phase of its development, the Platforming process was devoted to automobile motor fuel improvement. Old Dutch Refining Company, the first licensee, was a prime example of this since it operated on Michigan crude which produces low octane motor fuel by straight run and thermal cracking methods. F-1 octane rating of Michigan naphtha is about 52 clear and will reach only 71.4 with 3 cc TEL. Platformed naphtha tested 79.9 clear and 93.6 with 3 cc TEL. After installing the first Platformer, Old Dutch raised its house brand motor fuel rating to 85.5 octane with 1.5 cc TEL. Product improvement was greater than previously possible with thermal reforming and processing losses much lower.

With the outbreak of hostilities in Korea, attention of the industry was centered on the need of the nation for increased volumes of avgas and aromatics. Experiments were conducted in batch operation which proved that significant quantities of badly needed aromatics could be produced by Platforming.

Work was centered by UOP researchers as well as in other laboratories on recovery methods, and as a result three processes are now available to the industry.

Shell's extractive distillation process and the Udex process developed by Dow Chemical and UOP are in commercial operation, and Sun Oil Company is building a commercial unit of its Arosorb process which has been under development and pilot plant study for more than eight years.

The first commercial Udex unit went on stream a little over a year ago at the Eastern States Petroleum Company plant at Houston. In September, Cosden Petroleum Corp. completed a combination unit in which both the Platforming and aromatics separation functions are accomplished in an integrated operation. In addition to nitration grades of benzene and toluene, Cosden is producing specification xylenes. A complete list of Platformers and Udex units now operating, building or under contract is given in an accompanying tabulation.

In 1952 it is estimated that finished benzene produced from Platformates totaled 640 barrels per calendar day, while this year the output will be nearly five times as great. Estimated production of finished aromatics from Platformate is given below:

	Barrels Per Calendar Day		
	1952	1953	1954
Benzene	640	3,330	3,330
Toluene	950	4,490	4,490
Xylenes	680	1,490	3,090
C_9+	180	230	230

The largest Platformer thus far built went on stream at the refinery of Shell Oil Company, Inc., at Houston on February 26. This plant will turn out 19 million gallons of benzene and 33 million gallons of toluene yearly. The UOP Platformer here is integrated with a Shell extractive distillation plant.

This installation will add about 10 percent to the nation's annual domestic output of benzene and will greatly increase the volume of toluene. This is in addition to the plant's aromatic and non-aromatic by-products which are blended into avgas, motor fuel and special products.

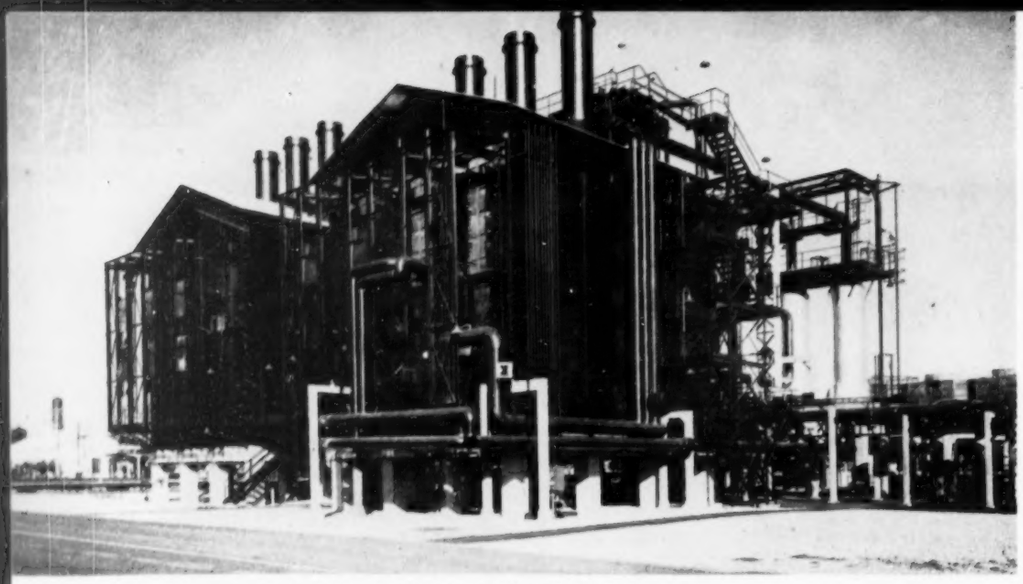
The Platformer has a design charge rate of 16,000 b/sd for motor fuel production and 13,000 b/sd for aromatics. Present production is confined to benzene and toluene, and no motor fuel operation is contemplated in the immediate future.

An interesting feature of this plant is the use of turbine-driven centrifugal compressors—the first ever installed on a Platformer—to circulate hydrogen recycle gas through the system.

Another is the use of "Turbo-grid" trays, developed by Shell, instead of bubble trays in the fractionation and absorbtion columns. Construction costs reportedly were reduced by this innovation, and their use is expected to keep maintenance down.

UOP Updraft Equiflux heaters, each having three cells, are an unusual feature of the Platformer. Each tube receives direct radiation from both sides instead of one side. Elevation of the heaters enables firing to be done from the ground level. The charge to the first reactor is preheated in all three cells of the first heater, which has a convection section that acts as an economizer to boost the unit's thermal efficiency. The charge is reheated between each of the reactors in cells of the second heater, which is used to generate 15,000 to 20,000 pounds of steam per hour in a steam generator installed in the convection system. A high degree of thermal efficiency on the overall heating system is thus produced.

Other features of this combined installation are the four high pressure reactors —the largest yet constructed for any Platforming unit—and the distillation columns of the extractive unit, which range up to 10½ feet in diameter and are 163 feet high.



Heaters employed by Standard of California to heat and reheat feed stock between reactors. Two of the battery of five reactors are seen in the right background.

There are three phases of the refinery's processing, of which the initial one is the feed preparation. Light naphthas are distilled from East and West Texas crudes, then blended with a selected naphtha cut shipped from Shell's refinery at Wood River, Ill. The feed stock mixture is charged to the Platforming feed preparation unit and other similar units, and fractionated to provide narrow range feed stock containing nearly all of the C_6 and C_7 fractions.

Feed stock is then charged from the fractionators to the Platformer, where the catalyst, which contains platinum, reforms components of the feed stock into aromatics.

Reactor effluent is separated into a liquid and a gas stream. Part of the gas stream is vented to refinery fuel through an absorber to recover light hydrocarbons, including benzene. The rest is recycled to the process through a gas scrubber to remove and recover hydrogen sulfide.

The third step in the refinery's process consists of depentanizing the liquid stream and charging it to the aromatic recovery unit, where the aromatic hydrocarbons are separated and purified.

The Houston installation is the third Platforming facility now in operation by Shell to produce aromatics. The two older facilities—at Wood River and Wilmington, Calif., — were converted from existing units. The one at Wood River has a charge rate of 4,000 b/sd, while the charge rate at Wilmington is 3,300 b/sd.

A fourth Platformer is being built for Shell. It will also be located at Wood River, and has a design charge rate of 16,000 b/sd, all of which will be devoted to motor fuel production.

UOP engineers handle the specification of equipment and detailed design for the feed preparation at Houston. Procon Inc. contracted to build the feed preparation unit and Platformer.

Second largest Platformer thus far completed was built by Standard Oil Co. of Calif. at El Segundo. This unit has a charging capacity of 12,100 b/sd. A gasoline fractionating unit with a capacity of 26,000 b/d was built by Standard to produce a special naphtha fraction high in naphthenes for charging to the Platformer.

Standard will fractionate the Platformate to produce benzene which is to be used as feed stock for still another process designed to produce phenol. Using the Hercules process, Standard will alkylate benzene with propylene from its cracking still tail gases to produce cumene. The cumene subsequently will be oxidized with air to produce phenol and acetone. Both the cumene alkylation and oxidation steps employ catalytic agents to promote the reactions. The phenol plant will cost $4 million when complete.

A majority of the present operators of Platforming units are using their reformers exclusively for octane improvement. The same is true of those now being built or under contract. Outside the United States only one plant, that of Cia. Espanola de Petroles S.A. at Santa Cruz Tenerife, will be equipped with facilities to produce aromatics. A vast majority will be used to supplement or eliminate thermal reforming operations with their heavy gas losses.

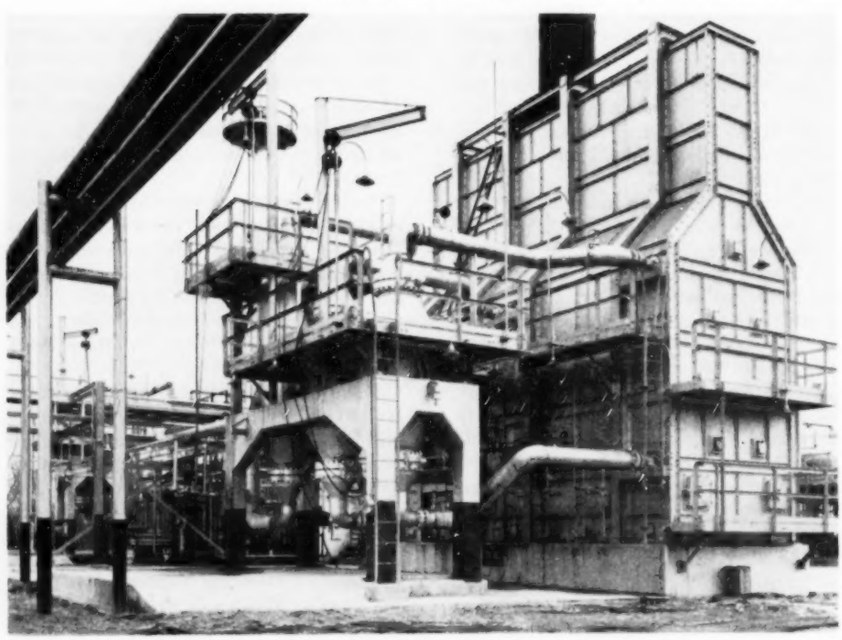
Most of those producing aromatics in the United States will operate on a blocked-out basis to produce aromatics part of the time and improved motor fuel blending stock part of the time.

One refinery originally had intended to use the Platformer principally to produce benzene and toluene. It was decided later to increase the original basic capacity, designing the plant to process both light naphtha for production of benzene and toluene and heavy naphtha to turn out motor fuel Platformate. In the latter operation, the unit is yielding a 95-98 F-1 leaded octane Platformate.

This refinery's Platformer is one of three scheduled to operate on a blocked-out basis. In this modification, production is divided so that for a given time it operates only to produce motor fuel Platformate. Production during the rest of the time is concentrated on benzene and toluene and/or xylenes.

The Platformers operating on blocked-out schedules charge feed stocks of widely divergent naphthenic content and boiling ranges. F-1 leaded octane numbers of the other two units running on this modified schedule are 95-95.5 and 92-94. Aromatics yields are consistently of the highest purity.

U.O.P. reactors and heater at the Roosevelt Oil and Refining Corp., Mount Pleasant, Mich., first refinery to use the new Platreater for hydrogenation of olefins from a nearby petro-chemical plant.



Another instance of a Platformer's versatility is found in a unit which processes a mixture of three different naphthas having widely varying boiling ranges. When processing this mixture, the plant produces an octane number product of 91.5-92.5. But during several extended periods, the unit has processed approximately 10 percent visbroken gasoline with virgin naphtha. During this time, the product octane number was maintained in the range of 91.5-92.3.

One of the outstanding examples of high quality yields obtained from Platformate is found in a unit which, since it went on stream more than a year ago, has been producing aviation gasoline base stock and benzene simultaneously. This stock, when blended with isopentane, has a rich mixture performance number of 125-135 with 4.6 cc TEL. The refinery is producing a finished grade 100-130 aviation gasoline, blending outside alkylate, Platformate, isopentane and some raffinate from a Udex installation, with which the Platformer is integrated.

Platformers can be geared to the demands of various marketing areas. Take the case of a unit which at times has produced a 97 F-1 leaded octane number product. This high rating was necessitated by the demands of a marketing area, far removed from the refinery's locale, which called for a premium gasoline meeting particularly rigid specifications. For the remainder of the time this Platformer's leaded octane number product has been maintained at 95 F-1.

Although Platforming is a relative newcomer to the petroleum refining field, its impact on the total production of superior quality gasoline has been tremendous. Since the Old Dutch unit went on stream, approximately 23 million barrels of Platformate have been produced. When the 36 units now in design or construction stages are on stream, the total charging capacity of the 58 Platformers will be 309,113 barrels per stream day, or about 102 million barrels annually.

Except in the case of the Platreater, little or no process use of hydrogen has been undertaken as yet by catalytic reformer operators. The Platforming process has a by-product yield of about 500 cubic feet of hydrogen per barrel of charge. Based on the estimate above, there will be available some 50 billion cubic feet of hydrogen per year when present Platformers are in operation. Other catalytic reformers will add materially to this volume. The availability of such large quantities may be expected to expedite the development of hydrogenation processes such as Platreating which will employ the gas in other manner than as fuel. The current acceleration in petrochemical research in which catalysis is playing a major role makes such developments a reasonable prediction.

TABLE I

PLATFORMERS ON STREAM

Licensee	Location	Operation Started	Design Capacity b/sd
Old Dutch Ref. Co.	Muskegon, Mich.	10/28/49	1,500
Shell Oil Co.	Wood River, Ill.	3/15/51	4,000*
Kendall Ref. Co.	Bradford, Pa.	4/27/51	1,500
Bell Oil and Gas Co.	Grandfield, Okla.	6/21/51	1,500
Johnson Oil and Ref. Co.	Cleveland, Okla.	6/22/51	1,843
Mid-West Refs., Inc.	Alma, Mich.	7/15/51	1,500
Premier Oil Ref. Co.	Fort Worth, Texas	7/17/51	1,500
Aurora Gasoline Co.	Detroit, Mich.	9/21/51	4,500
Taylor Oil and Gas Co.	Port Isabel, Texas	12/10/51	4,000
Eastern States Pet. Co., Inc.	Houston, Texas	2/1/52	4,500**
Shell Oil Co., Inc.	Wilmington, Calif.	5/26/52	3,300*
Canadian Oil Refs., Ltd.	Broomfield, Ontario	6/30/52	3,800
Petroleum Specialties, Inc.	Flat Rock, Mich.	7/8/52	900
Bitumen and Oil Refs., Ltd.	Matraville, New South Wales	7/11/52	1,500
Atlas Processing Co.	Shreveport, La.	7/26/52	4,440*
Skelly Oil Co.	Longview, Texas	9/5/52	1,850
Cosden Petroleum Corp.	Big Spring, Texas	9/14/52	4,320**
Wilcox Oil Co.	Bristow, Okla.	10/12/52	1,500
Elk Refining Co.	Falling Rock, W. Va.	11/12/52	1,500
Standard Oil Co. of Calif.	El Segundo, Calif.	12/9/52	12,100*
Roosevelt Oil and Ref. Corp.	Mount Pleasant, Mich.	1/8/53	1,800**
Shell Oil Co.	Houston, Texas	2/26/53	16,000*

* Aromatics ** Aromatics with Udex

TABLE II

PLATFORMERS UNDER CONTRACT

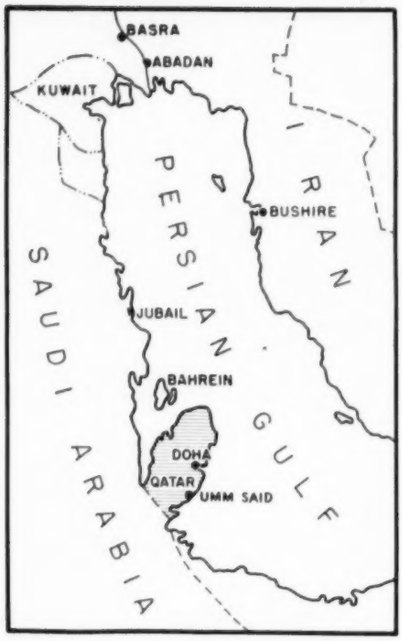
Licensee	Location	Design Capacity b/sd
Anglo-Iranian Oil Co. Ltd.	Llandarcy, Wales	6,000
Anglo-Iranian Oil Co. Ltd.	Kent, England	6,000
Anglo-Iranian Oil Co. Ltd.	Kwinana, Australia	6,000
Anglo-Iranian Oil Co. Ltd.	Aden	12,000
Aurora Gasoline Co.	Elsie, Mich.	1,500
California Oil Co.	Perth Amboy, N. J.	10,700
C.E.P.S.A.	Santa Cruz, Tenerife	5,000**
Col-Tex Refining Co.	Colorado City, Texas	1,500
Continental Oil Co.	Lake Charles, La.	6,000*
Continental Oil Co.	Ponca City, Okla.	5,000
Great Southern Chem. Corp.	Corpus Christi, Texas	4,000**
Gulf Oil Corp.	Philadelphia, Pa.	16,000
Gulf Oil Corp.	Port Arthur, Texas	29,000
Ill. Farm Supply Co.	Pana, Ill.	650
Kca Oil Co. Ltd.	Maifu, Japan	1,300
Kuwait Oil Co.	Shaikhdom of Kuwait	12,000
McMurrey Refining Co.	Tyler, Texas	5,000
McNutt Oil & Ref. Co., Inc.	Brickland, N. M.	600
Mediterranean Refining Co.	Sidon, Lebanon	600
Mitsubishi Oil Co.	Kawasaki, Japan	1,500
Nippon Petroleum Ref. Co.	Kudamatsu, Japan	1,300
Onyx Refining Co.	Abilene, Texas	650
Republic Oil Refining Co.	Texas City, Texas	5,500*
R. J. Oil & Refining Co.	Princeton, Ind.	600
Rock Island Ref. Corp.	Indianapolis, Ind.	1,400
Rothschild Oil Co.	Santa Fe Springs, Calif.	1,000
S.G.H.P.	Dunkirk, France	6,000
Shell Oil Co., Inc.	Wood River, Ill.	16,000
Showa Oil Co.	Kawasaki, Japan	1,300
Standard Oil Co. (Ohio)	Lima, Ohio	12,000
Sun Oil Company	Toledo, Ohio	11,000
Taylor Oil & Gas Co.	Corpus Christi, Texas	5,000
The Texas Co.	Amarillo, Texas	4,700
The Texas Co.	El Paso, Texas	5,000
The Texas Co.	Port Arthur, Texas	20,000
Undisclosed		8,000

* Aromatics ** Aromatics with Udex

TABLE III

ROOSEVELT OIL AND REFINING CORP.
UDEX UNIT FEED AND PRODUCTS

	Feed	Raffinate	Benzene Product	Toluene Product
Benzene, Wt. %	15.3	0.0		
Toluene, Wt. %	22.6	0.7		
Boiling Range, ASTM D-835-47, °C.	—	—	0.9	1.0
Acid Wash Color	—	—	+1	0
Freezing Point, °C.	—	—	+5.3	—
Gravity, °API	58.0	76.7		
ASTM Distillation, °F.				
IBP	146	144		
5	163	150		
10	164	152		
30	170	158		
50	179	164		
70	193	174		
90	222	194		
95	237	206		
EP	272	274		
% Recovered	98.5	99.0		
% Bottom	1.0	0.5		
% Loss	0.5	0.5		



Map of Persian Gulf area showing location of Qatar peninsula.

Qatar takes important place in Mid-East oil picture

By E. Lawson Lomax

THE Sheikhdom of Qatar comprises the peninsula of that name which projects northward from the eastern side of the Saudi Arabian coast on the Persian Gulf, from latitudes 24° 45″ to 26° 20″ and between longitudes 50° 45″ and 51° 40″. It has an area of about 4,000 square miles and a population of about 16,000. Climatically and physically it is very similar to Saudi Arabia, with intense heat in summer and very sparse vegetation. The Sheikhdom is independent and under British protection.

The original oil concession was granted by Shaikh Abdullah bin Qasim al Thani, father of the present ruler, on May 17, 1935 for a period of 75 years to Petroleum Development (Qatar) Ltd., an associate of Iraq Petroleum Company.

This was modified to introduce the 50-50 principle now generally established in the Middle East, under which modified concession the ruler, Shaikh Ali bin Abdullah bin Qasim al Thani, will receive half the profits accruing from the operation of the company in his territory in-

Loading lines from storage to tankers anchored offshore from Umm Said.

Standard rig employed in drilling on Qatar. Well shown is the exploratory test at Al Karaib.

stead of a fixed royalty as provided in the original concession.

An exploratory well was started in October 1938 and struck oil in the No. 2 limestone of the Zekrit formation in January 1940. This first well gave an estimated initial production of 5,000 b/d at a well head pressure of 367 psi. A second well 10 miles south, completed in March 1940, gave similar results. A third well drilled 2½ miles east of No. 1 was completed in edgewater in both the No. 3 and No. 4 limestones in May 1942.

Owing to the war, operations were then suspended. The wells were plugged and equipment removed. Work was not resumed until 1947. The geology established by drilling is shown in Table I.

Although much of the peninsula is covered with wind-blown sand, there are numerous outcrops of Eocene limestone. Surface elevation over the Dukhan field rises as high as 250 feet, whereas other parts of the peninsula are about 150 feet above sea level.

The Zekrit formation, embracing three limestone production horizons, correlates with middle Jurassic producing strata in Saudi Arabia. On Qatar the Zekrit formation is encountered at about 5,100 feet at the crest of the structure.

Since resumption of operations in 1947 an intensive drilling program has been carried out with the object of determining the extent of the field and also for development of production.

At the present time, the proven extent of the field is about 30 miles long by three miles wide. The average depth of the wells is around 6,500 feet and production is obtained from two zones, Qatar 3 and 4. The limestone from which production is obtained is not fissured.

In all, 31 wells have been completed, No. 31 being brought in on November 3, 1952, while No. 32 is being drilled. All but three of these wells have been drilled since 1947.

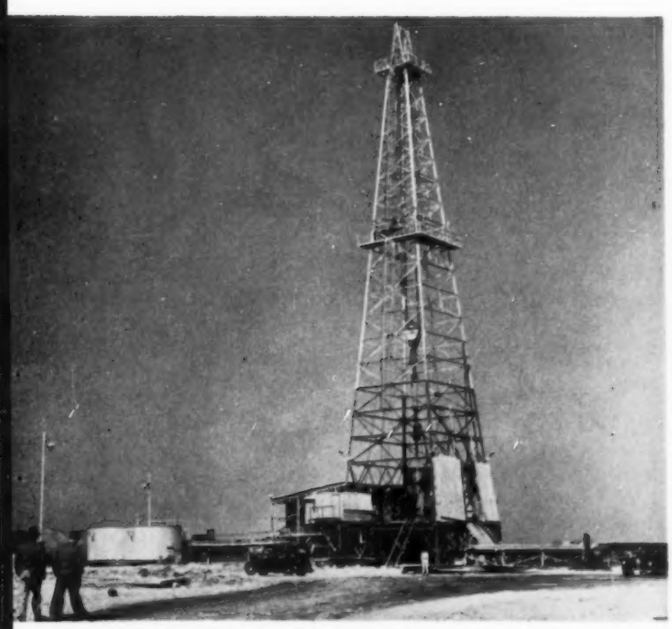
Production is presently being drawn from twenty wells. Two are being used as oil-water observation wells, one on each flank of the field, and one is used as a gas observation well on the dome. The other wells are closed in, awaiting operation when required.

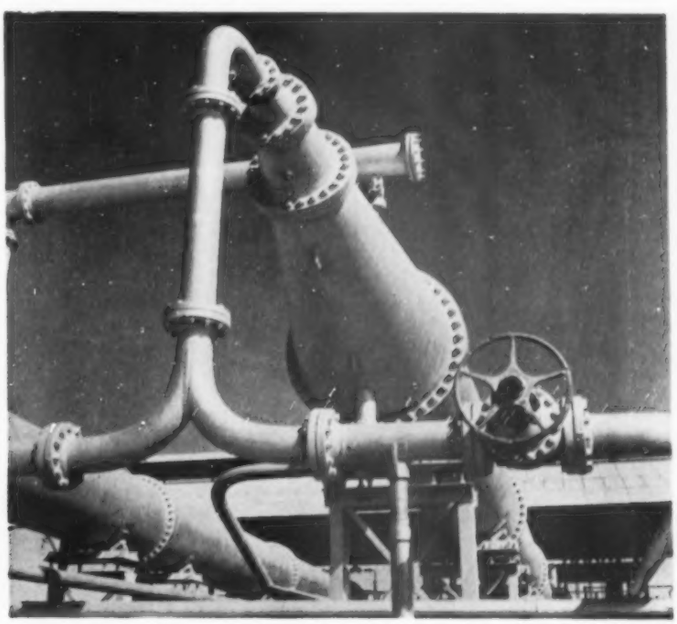
The gas/oil ratio is about 1,000. In general, well-head gas separators are employed, one or more wells being connected to gathering lines according to conditions.

There is one completed de-gassing station at Khatiyah, close to Dukhan, where gas is separated in four stages. This is of sufficient capacity for present requirements. The separated gas is used as far as possible for domestic and industrial purposes, but the surplus, which at present has to be burned, is increasing rapidly.

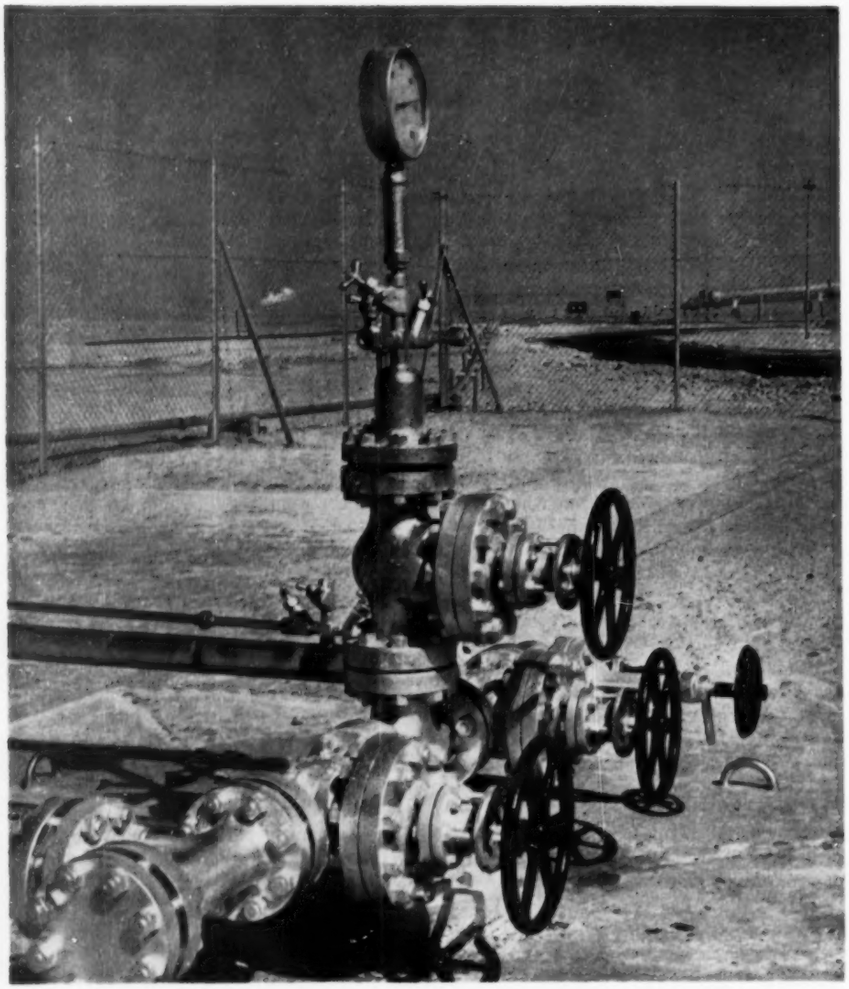
Crude oil production during 1952 was over three million tons, having risen from 1,700,000 in 1950 and 2,300,000 in 1951. Production up to the present time is from the Dukhan field, but exploration has been extended to Al Kharaib, located slightly to eastward of the center of the peninsula, where seismic survey and geological exploration has resulted in the location of an anticlinal structure of considerable extent. Structural drilling has been commenced in this location, the first exploratory well, Al Kharaib No. 1, having been spudded in on November 5, 1952.

Qatar crude is of intermediate type, predominantly paraffinic and of high sulfur content. Gravity is 34° API, gasoline content about 31.5 percent, kerosine dis-





Separators for degassing Qatar crude prior to pipe line shipment.



Christmas tree fittings on a completed well.

tillate 10 percent, and gas oil distillate 17 percent. Sulfur content is about 1.9 percent.

For general transport purposes and the dispatch of crude oil, facilities have been provided on the western coast of the peninsula at Umm Said, a point about 35 miles south of Dohah, the capital of Qatar.

The cargo jetty has facilities for unloading barges, which lighter cargo from vessels lying offshore in deep water, and material unloaded there is transferred by road to Dukhan on the west coast, a good metalled road having been laid between these points. Small vessels of shallow draft are also used to take cargo around by sea.

A 12-inch and 14-inch pipe line about 73 miles long has been laid from the Dukhan field to an ocean terminal at Umm Said where there is sufficient water for super-tankers to be loaded.

There are two loading berths with a 24-inch line running out to each. On the land side these lines are manifolded in such a way that any storage tank can be connected to either of the lines. At the seaward end the lines are each bifurcated into two 10-inch flexible hoses. When there is only one tanker on berth, a loading rate of 1,800-1,900 tons per hour can be maintained.

At present there are ten storage tanks in the terminal tank farm and more are to be erected to deal with the increasing production from the field.

Living accommodation for European and Indian staff is provided at Umm Said, together with recreational facilities. There is also an elementary school with an English teacher.

The company's main installations have been built at Dukhan, close to the field, and it is here that its principal activities are centered.

There are extensive workshops for all kinds of maintenance and repair of drilling machinery, motor vehicles and other equipment, together with large engineering stores which are necessary in an isolated place such as Qatar, where supplies are not readily available and long periods separate deliveries.

Residential quarters have been established for all grades of European staff, as well as for other imported labor and the indigenous Qatar personnel, which is employed as far as it is available and suitable.

The "Supalite" prefabricated houses for the senior married staff are the acme of convenience and comfort. They are air-conditioned with individual units and are very comfortable. Furnishings and kitchen equipment leave little to be desired by the critical housewife. The bachelor quarters are also well equipped, each individual quarter having its own bathroom and lavatory adjoining the living room, which is a combined bed-sitting room.

The staff dining room and clubhouse are well appointed, the meals served in the former being of high standard even for the Middle East, where great attention is paid to the provisions of ample quantities of high grade food to the various staffs of the companies operating there. Accommodation in the clubhouse is also of a high standard and would not disgrace any city club in the quality of its appointments. Extensive recreation facilities are supplied for all grades of staff, such as tennis courts, playing fields, cinemas and libraries.

Swimming pools are not provided as such, since the waters of the Persian Gulf, after the provision of bathing and diving platforms, dressing rooms and cafe, are ideal for this type of recreation. The high salt content gives a high specific gravity to the water and the merest tyro can bathe with the utmost safety and confidence.

In a country like Qatar, where no surplus food can at present be produced to feed imported personnel, all domestic supplies for staff have to be imported, as well as supplementary supplies for the indigenous population, and there the commissariat department has a very important duty to perform. It should be recorded, however, that this department is outstanding in its operations.

Regular supplies of fresh fruit and vegetables are flown in at least bi-weekly from Lebanon, Syria and other producing countries, and arrive in as fresh condition and in as great a variety as could be found anywhere.

Catering for the staff also involves the handling of large supplies of meat, poultry, game, flour, cereals, tea, coffee, sugar, canned goods, soap and other domestic requirements, which arrive in bulk shipments and are preserved in perfect condition, ready for retail distribution as required. Large storerooms for this purpose have been built and are maintained at optimum temperatures.

Experience enables the officer in charge to estimate the daily requirements in the retail stores very closely, so in the early morning goods are taken from storage and placed on display, on the help-your-

self system, whereby the shopper can collect her requirements in specially provided trollies, have them priced up to her and then take them or send them home. Non-perishable goods are on display permanently. In addition, the same department runs an up-to-date laundry and dry cleaning plant.

As is the custom in all spheres of activity of the Iraq Petroleum organization and its associates, careful attention is given to the provision of medical services, both in treatment of all types of maladies and in the exercise of preventive treatment.

At Dukhan the company has established a 40-bed hospital where all grades of staff receive treatment. This is under the control of the senior medical officer and his staff, with British nurses and Indian nursing orderlies, but it is the policy of the company to replace the latter by Qataris as soon as they can be trained for this purpose. The hospital is fully provided with modern apparatus, including X-ray equipment and an up-to-date operating theater. Attached to it is a dental center where all grades of employees are treated and can be supplied with dentures. In addition there are small clinics or first aid posts at all work centers.

At Umm Said, a 20-bed hospital is in operation which will be enlarged or replaced by a large main hospital in the future. Its present staff includes a European doctor, nursing sister and Indian nursing orderlies.

In the Trucial Coast area, small dressing stations are established at points where exploratory work is being carried out. At these places there are small detention wards of two or three beds where patients can be put under observation. Cases requiring further treatment are evacuated by air to the hospital at Dukhan.

Generally speaking, maternity cases are transferred to the large hospitals at Kirkuk or Tripoli, where there are suitable facilities, this particularly being the case during the hot season.

The medical staff for these above hospitals consists of one senior medical officer who has charge of the whole Persian Gulf area, three European and one Indian doctor, European nursing sisters and Indian nursing orderlies.

Kitchens and cooks have been provided whereby each nationality under treatment can be supplied with appropriate food.

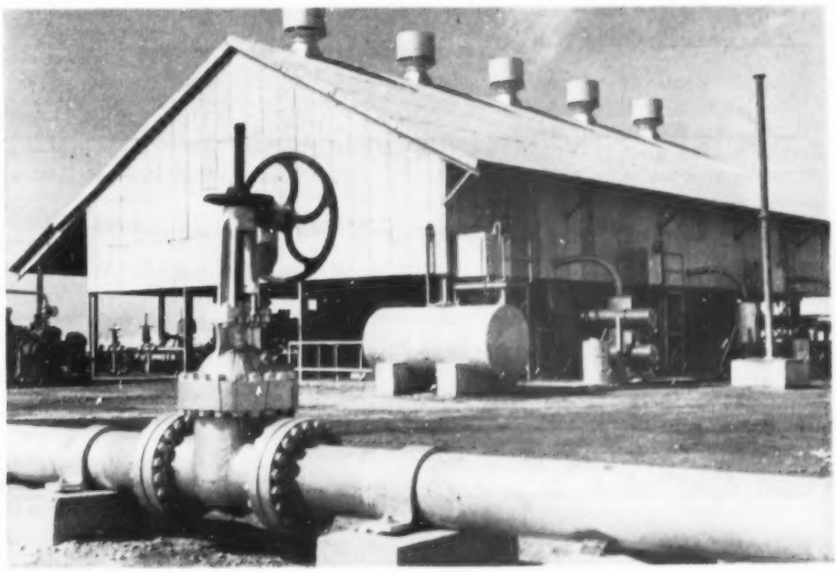
Fresh water for all culinary and domestic purposes has to be distilled from sea-water as there are no sweet water supplies available from other sources. Three distillation plants, each of a 100-ton distilled water capacity per day, have been installed to supply this requirement. Two of these plants are of sufficient capacity to supply present requirements, with one acting as standby, being brought in successively with the others during maintenance and repair periods.

TABLE I

GEOLOGY OF QATAR

Age	Local Names	Development	Thickness in feet
Eocene	Bahrain formation	Limestone with shales	1,000
Maestrichtian	Tayarat limestone	Limestone	600
Senonican	Khatiyah formation	Limestones & shales	800
Cenomanian	Mauddud limestone	Limestone	200
Lower Cretaceous	Rutbah sandstone	Sands & shales	500
Cretaceo-Jurassic	Musandam formation	Limestone with subordinate shales	2,000
		Anhydrite	400
		No. 1 limestone	35
		Anhydrite	30
Middle Jurassic	Zekrit formation	No. 2 limestone	20
		Anhydrite	50
		No. 3 limestone	84
		Anhydrite	60
		No. 4 limestone	133+

Dukhan manifold and field separators in connection with the main line pumping station.



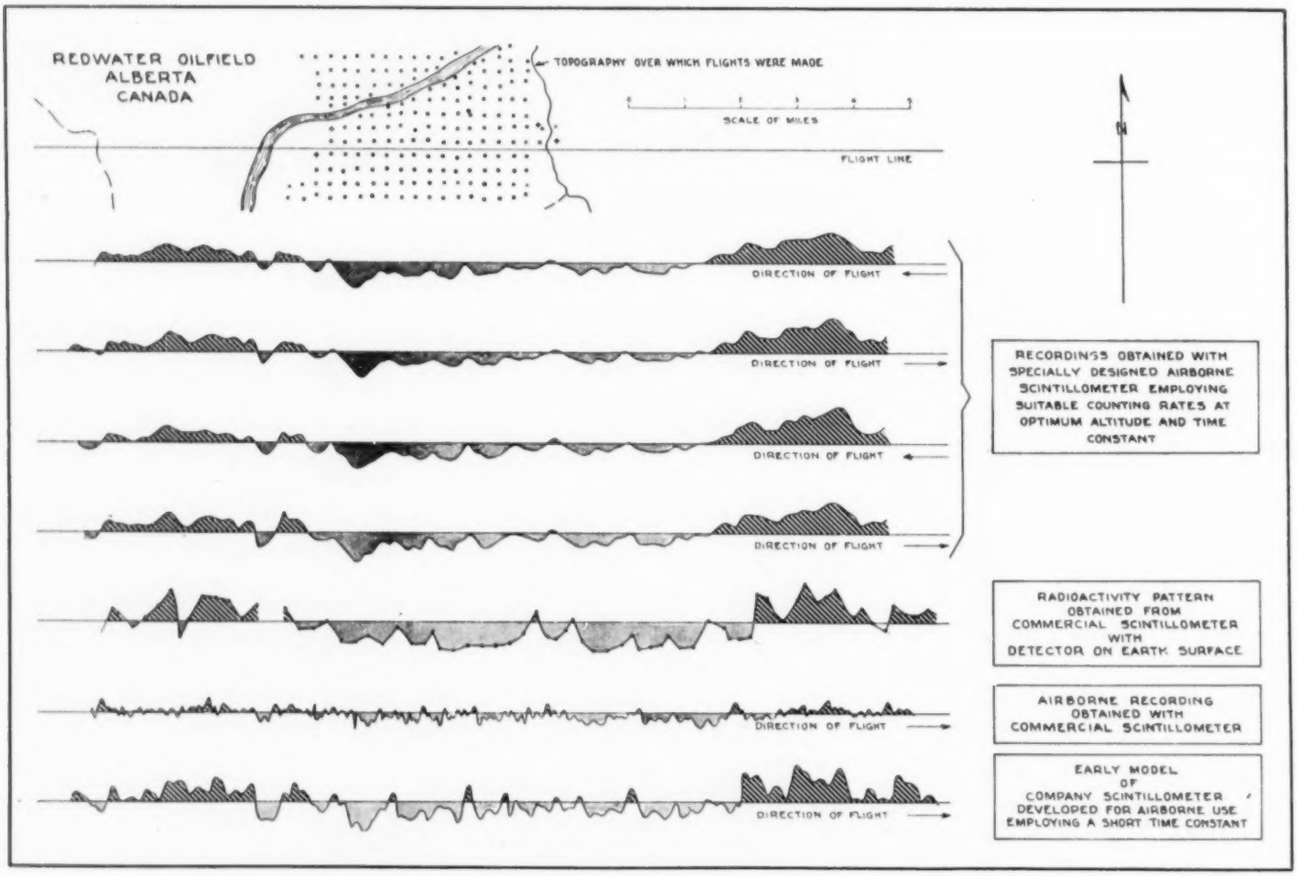
Khatiyah pump station.

Oil prospecting with the radioactive method

By Hans Lundberg and George Isford
Lundberg Explorations Ltd., Toronto.

IN THIS "ATOMIC AGE" the application of radioactive tracer techniques has reached almost every phase of industry and resulted in the development of extremely sensitive detection instruments. The modern Geiger counter is known to almost everyone, but the more efficient and more sensitive scintillation detector[1] only recently has come into practical use. Portable Geiger counters, as well as scintillation detectors, have been built especially to aid in the search for uranium ore, and very recently, airborne scintillation detectors were adapted by us for indicating the presence of oil accumulations.

Very encouraging results have been obtained. A great number of known oil fields have been flown and mapped to gain sufficient material for working out rules and principles of interpretation. Large areas of unknown territory were flown, and drill holes put down on typical indications are


REDWATER OILFIELD
ALBERTA
CANADA
TOPOGRAPHY OVER WHICH FLIGHTS WERE MADE
SCALE OF MILES
FLIGHT LINE
DIRECTION OF FLIGHT
DIRECTION OF FLIGHT
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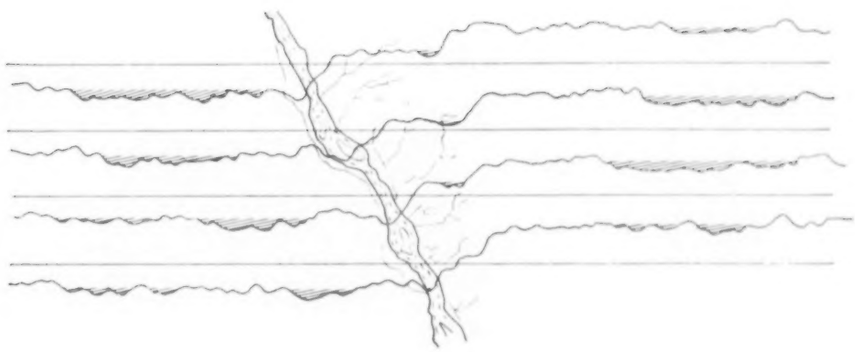
DIRECTION OF FLIGHT
RECORDINGS OBTAINED WITH SPECIALLY DESIGNED AIRBORNE SCINTILLOMETER EMPLOYING SUITABLE COUNTING RATES AT OPTIMUM ALTITUDE AND TIME CONSTANT
RADIOACTIVITY PATTERN OBTAINED FROM COMMERCIAL SCINTILLOMETER WITH DETECTOR ON EARTH SURFACE
AIRBORNE RECORDING OBTAINED WITH COMMERCIAL SCINTILLOMETER
EARLY MODEL OF COMPANY SCINTILLOMETER DEVELOPED FOR AIRBORNE USE EMPLOYING A SHORT TIME CONSTANT

Fig. 1: Flight line repetition examples.

Fig. 2: Mid-continent United States, showing river.



now very good wells producing oil from rather great depths.

Sometimes the radiation pattern obtained in these airborne surveys may be difficult to interpret, and this, in the minds of some geophysicists, has caused doubt as to the usefulness of the method. The reason for inconclusive results may be found in an inadequate method of interpretation, but a great deal also depends on the survey technique itself.

Observations taken at ground stations are too easily disturbed by purely local conditions. A skillful operator may compensate for instabilities in his instruments, but local irregularities in topography, geology, etc. still greatly affect his counting rate. Water on the surface will absorb much of the earth's radiation and thus reduce the counting rate. Wet or water-saturated ground may cause a reduction in counting rate which becomes very difficult to determine unless the radiation pattern is known over a very large area. Therefore, mapping by airborne instruments becomes the ideal method.

Proper operation of the airborne instruments is assured by having high detector sensitivity and large area of influence, so that statistically valid recordings can be obtained in the short time the detector passes over any given area at operational speed and altitude. To obtain sufficient resolution of the radiation pattern, the integrating time constant must be chosen with great care. If small anomalies are to be detected with records statistically valid at 200 to 300 feet altitude, the count must be at least 600 per second, even on low background readings.

The scintillation counter with large NaI (T1) crystals has more than one hundred times higher "low energy" gamma detection efficiency than the Geiger counter. For our airborne surveys, they have been developed into stable multiple-head, low noise instruments with efficient recorders. The power for operating the instruments is taken from the aircraft's electrical system.

Examples of repeated flights with an up-to-date airborne scintillometer, along a line across the central part of the Redwater oil field in Alberta, are shown on Figure 1.

Below, on the same figure, are shown results obtained with a commercial scintillometer. Observations taken at stations on the ground along the same line agree well with our repeated recording. However, airborne recordings with this commercial instrument become difficult to interpret since repeat recordings do not show much similarity owing to the low counting efficiency.

Finally, the last line shows recording with an early model, especially developed for airborne use. The counting efficiency of this instrument is good enough to give reasonable repeats, but the time constant has been too short.

Only after the stage of reliable recording had been reached late in 1950 could the results from systematic mapping of large areas be correlated with known geology and oil occurrences.

The gamma rays recorded in these surveys are from the upper two or three feet of surface; even the high energy gamma radiations from radium have an extremely small probability of escape to the surface from a depth of four feet of soil or two feet of rock.

The radiations originate from disintegration of thorium, uranium, radium and their breakdown products and to some extent from the radioactive potassium isotope (K40). The total contribution from these radiations makes up the earth's background count which would correspond to approximately .001 percent U_3O_8 concentration.

There are, however, two other sources that contribute to the background count of the instrument. These are contamination from aircraft instruments, etc. and from cosmic radiation. Since our airborne detectors are extremely sensitive to low energy radiation, fluorescent wrist-watch and instrument dials must be removed or shielded so that contributions from such sources become negligible.

As for cosmic rays, the number of events recorded per second is negligible compared with the gamma ray effect. This occurs because of the greatly improved sensitivity of these new devices. Thus cosmic ray shielding is quite unnecessary.

In flights over deep lakes several miles from shore, where the earth's contribution to the count was nil, the combined effect of contamination and cosmic rays remained constant in tests lasting several hours. The total effect is only 12 to 15 percent of the earth's normal background count and varies only slightly with altitude. On Figure 3 the lower solid line illustrates the variations in this effect with altitude. The upper curve, on the same figure, shows the counting rate variations with altitude as recorded over comparatively dry area underlain by sediments. This curve flattens for the lower altitudes instead of following the exponential curve which would be expected in the case of a point source.

A thorough analysis of this problem does not belong here. Principles of how to calculate the effect from buried radioactive sources have been well written up by Condit and Graves[2].

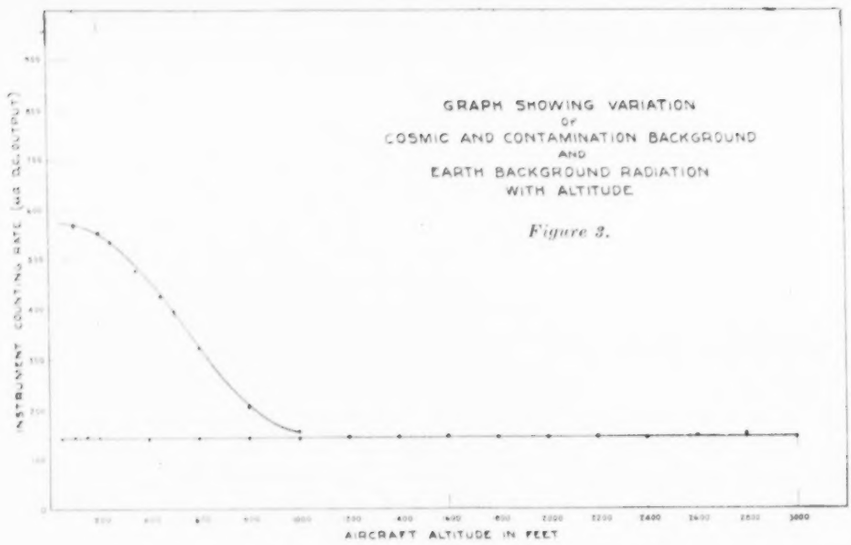


Figure 3.

Our source, nowever, we assume to be a series of areas, and its counting rate varies with elevation and the length of time that this source is in range of the detector. Small variations in altitude tend to increase or decrease the effective area which becomes a self-compensating effect resulting in very little change in average counting rate.

As a rule when surveying an area, recordings are made along a number of parallel lines flown at one-quarter, one-half or even mile intervals, depending on the detail required. To obtain sufficient control, recordings are also made along lines flown at right angles to these parallels and some two to four miles apart. The aircraft is flown at a constant distance above ground, generally between 200 and 350 feet.

The instrument's integrating time constant is set to give maximum resolution corresponding with the altitude to be flown. After each flight the recordings are processed, adjusted to linear scale and plotted directly along the flight lines of the maps, using a background reference level as datum.

Variations in the radiation over different types of rock formations are generally easy to recognize. Outcrops of marine shales often show high activity, and in most cases changes in surface geology may be outlined quite accurately. This is especially true where there are sharp contrasts. An example of a sharp intensity change is shown in Figure 2. On the right side of the river the intensity is considerably higher than on the left side, caused by the exposure of different rocks at the surface. It will be noted that the water in the river, by absorbing the gamma rays, causes a marked drop in the radiation intensity. Although four feet of water will almost mask all the earth's radiation, this masking effect is lessened as the depth of water decreases. Over wet, swampy ground absorption may also be noted.

During the same flight a second gamma ray count recording is made with an appropriate energy spectrum range and employing a much longer time constant. This recording is used to indicate moisture datum changes and to aid in the general background determination.

The general effects of rivers (sometimes whole drainage systems), muskegs, swamps and lakes are first identified in the radiation pattern and subsequently eliminated. Where variations in the rock formations occur, appropriate datum corrections must be made. Areas of radioactive lows that then remain may indicate the presence of oil or gas.

The low intensity over oil or gas fields is the most pronounced feature in the radioactive pattern. This has been well established over a great number of fields under very different conditions so that the possibility of mere coincidence can be ruled out.

Often the boundaries of the low anomalies conform amazingly well with the outline of the oil or the gas field.

How can we now explain these radioactive low anomalies over oil or gas fields?

As a rule, oil or gas is trapped between an impervious roof and a water floor. Almost without exception, the water is rich in chlorides with low or no sulfate content and capable of holding large amounts of radium in solution.

The chlorides in these waters originate partly from trapped seawater in the sediments, partly from small amounts of salt in or between the mineral grains, or even from salt beds. The reason for the low sulfate content is its gradual reduction to sulfide by organic matter in the sediments.

By diffusion, there is a continuous movement of chlorides from the deep waters to the surface where they are carried away by run-off of the surface water. Satisfactory proof of this is the more or less regular increase of chloride content with depth in all rock formations. This gradual increase is found even in the upper ground water zones. The chlorides removed from the deeper waters by this upward diffusion and carried away by the run-off of surface waters are replenished by dissolving of more salt from the rock formations.

It is now rather obvious that an oil or gas accumulation constitutes an obstruction between the water floor and the waters higher up. In other words, the layer of hydrocarbon prevents the replenishing from depth of the salts that have been carried away by the surface run-off, so that the area above the hydrocarbon layer becomes gradually very low in chlorides.

What happens to the chlorides will naturally also happen to other solubles, even if the diffusion process for many of them may become more complex and disturbed by effects of the rock formations and surface water than is the case of the chlorides.

It is therefore quite likely that the radioactive lows found over oil or gas fields may be caused by this interruption in the salt diffusion from depth.

Oil or gas accumulations occur mainly where direct leakage or escape is prevented. Therefore, directly above an oil pool there will be a lack of hydrocarbons, more sulfates will remain unreduced, and the power to dissolve radium will be considerably lessened.

Earlier we had advanced the hypothesis that the low radiation anomalies over oil pools are mainly caused by upward movement of ground water capable of dissolving radium since its sulfates have been reduced by hydrocarbons present in small amounts[3].

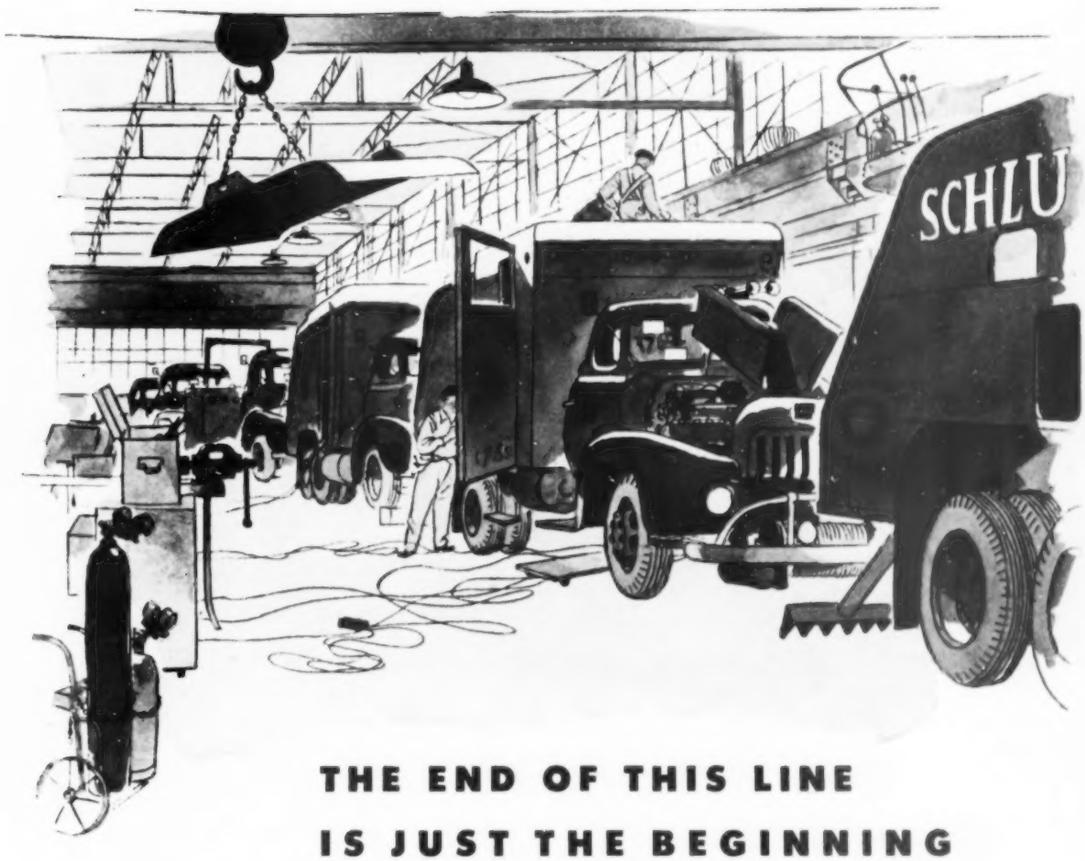
As this upward movement cannot penetrate a pool of oil or a gas accumulation, it follows that there will then be no transport of radium to the surface, consequently only very low radioactive intensity will be recorded.

As more experience was gained as to the radioactivity distribution over oil or gas fields, we have come to the conclusion that the anomalies may be better explained by diffusion than by the movement of ground waters.

The main reason for this change of thinking is that lows over oil and gas pools have been found where it is difficult to assume any upward movement of ground waters. This does not mean that the process earlier outlined would not work where ground water movements are upward. Diffusion, however, seems to give a better general explanation of the lows found over the pools.

References

[1] For a review of the early work, see Pringle, NATURE, Vol. 166, P. 11, July 1, 1950.
[2] Richard I. Condit & J. D. Graves, *Locating Buried Radioactive Sources*, "NUCLEONICS," Vol. 10, No. 6.
[3] Lundberg, "*An Attempt to Interpret Radioactive Patterns Obtained from Airborne Recordings*," Proceedings of the Geological Association of Canada, 1952.



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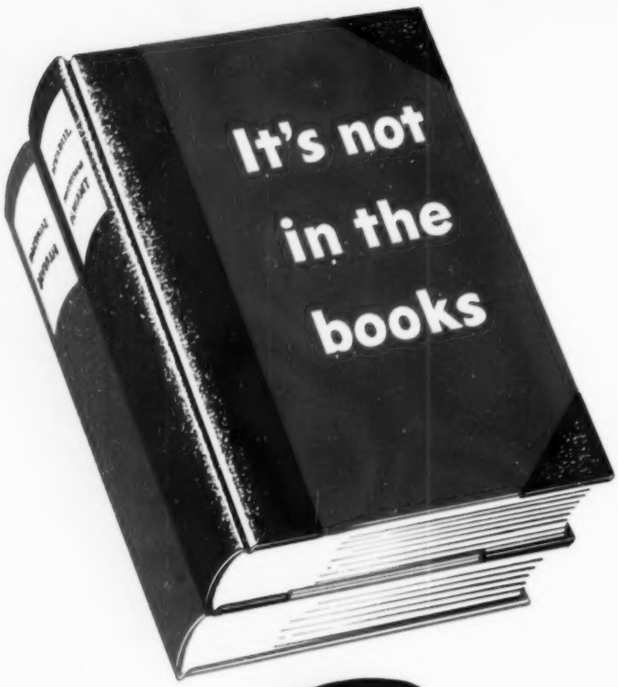

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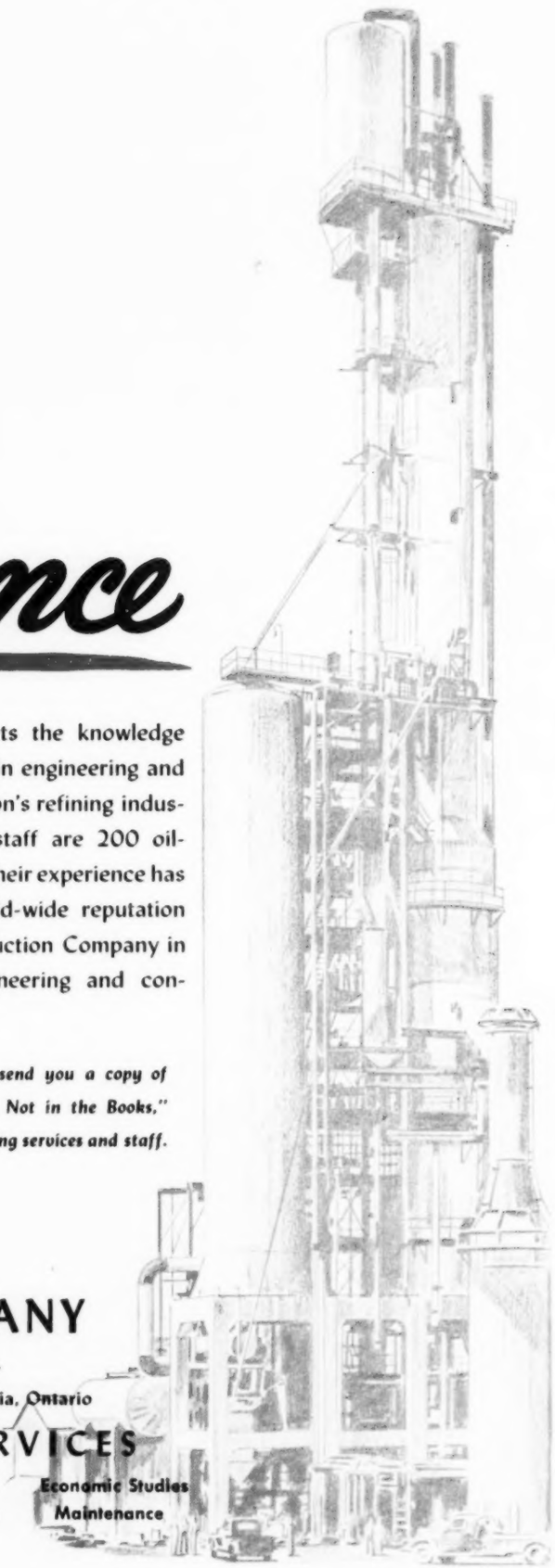

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British Oil Equipment Output 8.8% Over 1951

Figures published by the Council of British Manufacturers of Petroleum Equipment showing the value of equipment for the petroleum industry manufactured in the United Kingdom during 1952, totalling £91,400,600, indicate an advance of £7,409,200 ($20,746,000), or 8.8 percent over 1951. The report shows that British manufacturers are more than holding their own in this relatively new field, for it is only since the second World War that the country's heavy engineering industry has embarked on large scale manufacture of materials and equipment for the oil industry.

An examination of the comparative figures shows that the increase has been fairly well spread over all classes of products. The decrease in refinery equipment in 1952 was to be expected, as the vast post-war refinery building program is past its peak, but this was more than offset by the growth in demand for sheet metal for drums and cars, due to the increase in production of refined oils from the new refineries. This is also shown in the increased purchases of chemicals for refining the increased amount of products.

The table below gives details issued by the Oil Companies Materials Secretariat showing the value of orders for material and equipment placed in the United Kingdom for the years 1951 and 1952. The figures as now presented cover orders both for home and overseas:

VALUE OF ORDERS FOR MATERIALS & EQUIPMENT

General Classification	1951 January to December	1952 January to December
Geophysical & other exploratory equipment	£25,400	£10,400
Specialized equipment for drilling & production, including casing, tubing & drill pipe	9,245,100	8,799,500
Specialized equipment for oil refineries (not including pumps & valves)	2,901,500	2,028,200
Drum & can-making, filling & cleaning equipment, curbside pumps & other oil metering & dispensing equipment	1,441,900	1,552,100
Railcars, road tankers, aircraft refuellers	332,700	588,800
Drums, drumsheets & tinplate	7,930,800	10,526,700
Tankage (including tank fittings)	5,434,200	5,278,600
Tubulars, pipe fittings & valves (ferrous & non-ferrous)	16,055,400	15,366,800
Pumps (excluding slush, oil-well, curbside)	1,274,000	1,711,200
Boilers, boiler house plant & accessories	540,400	724,100
Electrical equipment (motors, generators, transformers)	4,269,300	5,808,500
Instruments, meters & gauges	796,800	1,008,500
Prime movers & compressors	1,610,300	2,005,200
Machine & hand tools, welding & miscellaneous machinery & stores	5,966,100	6,891,300
Ferrous & non-ferrous plates, sections, sheets & bars	2,991,000	4,100,000
Automotive equipment, all types	6,124,900	5,527,300
Laboratory equipment & chemicals, including hospital & medical supplies	445,500	543,900
Bulk chemicals, catalysts, barites	8,204,900	10,555,000
Cement & other building materials & hardware, including timber	4,281,100	4,480,300
Commissary, general requisites for office, warehouse, household, club and sports	4,100,100	3,895,200
Total	£83,991,400 ($237,695,662.00)	£91,400,600 ($258,663,698.00)

An example of the increasing co-operation between British and American manufacturers of oil industry equipment is the licensing agreement which has been ratified between Oil Well Supply Co. Ltd. (a wholly owned subsidiary of the United States Steel Corp.) and Sir W. G. Armstrong Whitworth & Co. (Ironfounders) Ltd. for manufacture of the complete range of Oil Well drilling machinery and production equipment, as well as a line of Wilson-Snyder and National Transit refinery and general service pumps.

This machinery will be fabricated at the Gateshead-on-Tyne works of the licensee company, and will be identical to that manufactured in the United States.

DIFFERENTIAL PRESSURE TRANSMITTER

Short & Mason Ltd., Walthamstow, London E.17, has developed a mercuryless force-balance type transmitter which converts a differential pressure into an equivalent 3/15 psi output, which is available in two ranges; one continuously adjustable from 0/20 to 0/200 inches of water, and the other from 0/80 to 0/800 inches of water. Working pressure rating of the body is 1,500 psi.

The differential pressure sensing device is a teflon coated glass cloth diaphragm held between stainless steel plates. Over-range pressures as high as 1,500 psi may be applied irregularly to either the low or high side of the diaphragm.

This instrument lends itself readily for use on liquid level and specific gravity applications due to the availability of 100 percent suppression of the metering range.

MULTIPLE TACHOMETRIC RECORDERS

Smiths Industrial Instruments Ltd., Cricklewood, London N.W.2., has developed a tachometer which enables a permanent charted record of rotational speed to be made. Up to six lines can be taken from generators situated on the machinery under observation and a glance shows the immediate and past happenings of all the sources.

A sensitive galvanometer and two synchronous actuating motors are incorporated, the motors taking current from A.C. mains. Changing of charts and ribbons is simple. One chart roll lasts a month at 2 cm per hour, and printing is by ink marks of different colors to identify the machines.

LIQUID LEVEL GAUGES

Elliott Bros. (London) Ltd., Century Works, Lewisham S.E.13, has developed a new system of precise liquid level indication and a supervisory console equipment. This equipment has been designed to meet the need for a remote liquid level gauge which is sufficiently accurate to replace manometric and dip tape. It can be used either with floating or fixed roof tanks. Up to 12 tanks can be connected to one receiving instrument, and if desired, it can incorporate two receiving stations. Transmission of indication is by the three-phase self-synchronising system known as the "Magslip," which is widely used by the Admiralty and Air establishments.

Elliott Brothers has cooperated with Anglo-Iranian Oil Co. Ltd. in the development of a supervisory control console containing measuring, controlling, recording and indicating instruments. Instruments are presented to the operator in the order of their importance so that labor can be reduced to a minimum.

First are instruments for indicating measured quantities. Secondly, there are means for comparing these quantities with the desired values and of affecting adjustments if necessary; and, lastly, there are recording instruments for maintaining a graphic record of the state of some of the measured quantities for reference purposes.

The indicators are superimposed on a mimic diagram of the plant, as shown. There are facilities for selection of certain values, e.g. temperatures, which can be measured on an Elliottronic indicator whose scale is visible immediately below the main panel.

In cases where the variable is automatically controlled, the Elliottrol supervisory panel is used. This gives a continuous indication of set point and measured values and provides facilities for switching from automatic to manual control. The switching arrangements in fact enable the operator to obtain all the information he wants and to exercise full control if desired.

Recording instruments are used in the wing of the panel where they are readily accessible, but not prominent. Their usefulness is increased by switching arrangements which enable them to record measurement at desired points at the discretion of the operator.

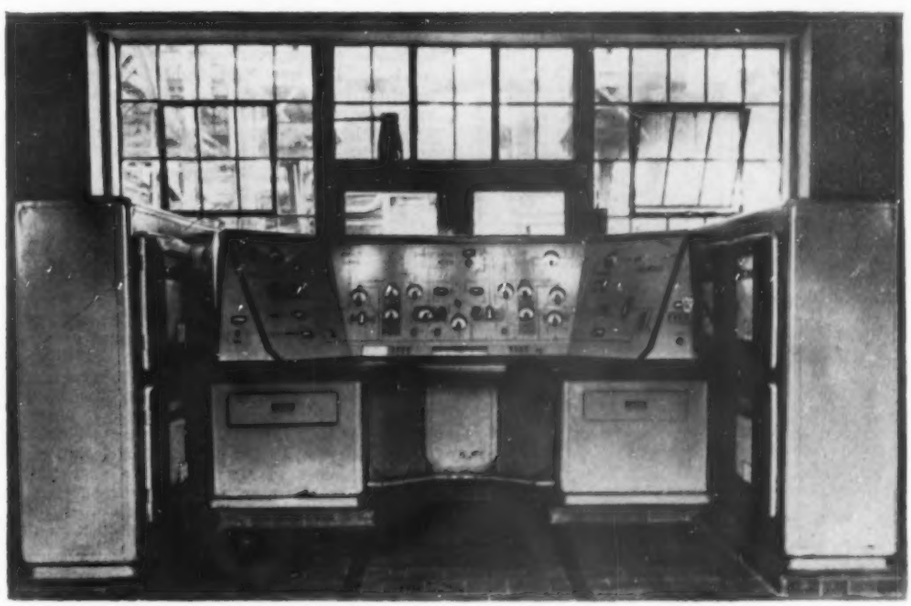
OXYGEN ANALYZER

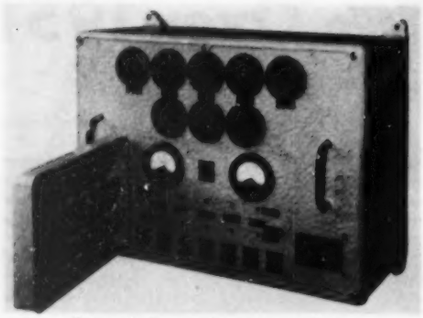
George Kent Ltd., Luton, Bedfordshire, has developed a new oxygen analyzer for use in connection with their "Multelec" potentiometer recorder for measuring continuously the percentage of oxygen in a flue or fuel gas and an air-operated power cylinder for the actuation of valves, dampers, etc., in automatic control schemes.

BOTTOM DUMP WAGON

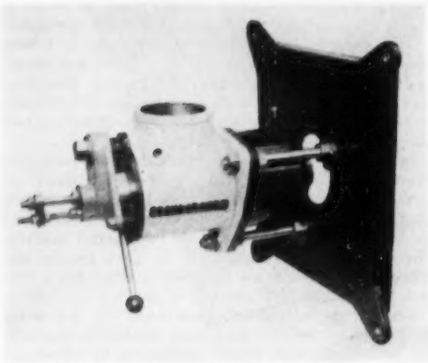
Euclid (Gt. Britain), Ltd., Newhouse, Lanarkshire, Scotland, has produced a new dump wagon with a pay load capacity of 40,000 lbs. This wagon is powered by a Leland 11.1 litre 154 hp engine with five speed gear box.

Elliott Bros. (London) Ltd. supervisory control console developed in cooperation with Anglo-Iranian Oil Co. Ltd.



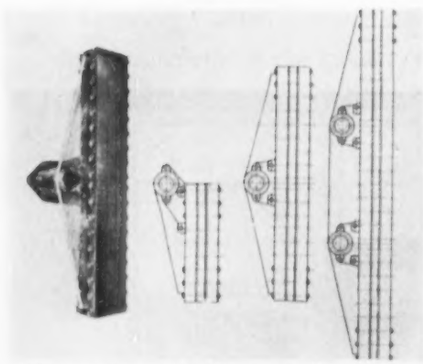


Dawe inflammable gas monitor.

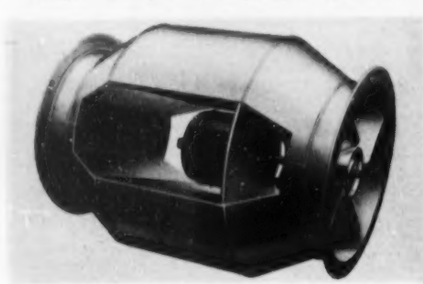


Shieldrop self-proportioning oil burner.

Canadian "Broomwade" portable compressed air plant.



Klinger "Perspex" flameproof illuminator.



Blackman "Tornado" bifurcated fan unit.

INFLAMMABLE GAS MONITOR

Dawe Instruments Ltd., 83 Piccadilly, London W.1., has developed an inflammable gas monitor for hazardous locations. The detector elements comprise a pair of hot catalytic platinum filaments in a Wheatstone bridge circuit. An amount of gas well below the explosive limit produces an unbalance in the bridge circuit and operates an alarm. The filaments are run at sufficiently high temperature to obviate a possible poisoning effect. Motor-driven cam-operated contacts connect the bridge circuit of each test point to the power supply and detector for short consequential periods to prevent overheating. Thus, for an equipment having five bridge circuits, each pair of elements is energized for only half a second of the complete cycle of 15 seconds. The equipment is completely self-checking in that a faulty element at any test point gives an alarm signal. It is also arranged to fail safe.

SELF-PROPORTIONING OIL BURNER

Shieldrop & Co. Ltd., Stotfold, Beds., has developed an oil burner in which, after the initial setting of the air-oil ratio, the ratio can be maintained through the whole range of the burner by the operation of one handle only. The use of such a burner simplifies the apparatus required for automatic temperature control. By removing three set screws, all internal parts of the burner may be withdrawn for cleaning or removal. The burner is made in sizes covering a range of fuel consumptions from 0.75 to 15 gph.

PORTABLE COMPRESSOR

Broom & Wade Ltd., High Wycombe, offers a new portable compressed air plant, specially designed for its subsidiary, Canadian Broom Wade Ltd., Toronto, to meet the requirements of the Canadian market for plant for the Canadian oil fields.

The plant is a Class 500 Type S.V. 606 model powered by a U.D.24 vertical, six cylinder, full diesel International engine developing 130 bhp (continuous rating). The compressor is the standard "Broomwade" sleeve-valve type, having six cylinders in two banks of three in "V" formation. This Canadian compressor unit delivers 480 cfm of free air at 100 psi. It is mounted on pneumatic tired wheels with rear mud guards and internal expanding brakes with connection for remote control and has incorporated a parking brake.

LEVEL GAUGES

Richard Klinger Ltd., Sidcup, Kent, produces a large range of reflex level gauges. For extremely high pressures, the type "S" gauge gives excellent service at working pressures up to 6,000 psi. These gauges do not rely on their tightness or compression of the joints by studs or bolts, but are kept tight by the internal pressure inside the gauge, which can be made up to any required length.

In connection with the gauges, Klinger makes a "Perspex" flameproof illuminator. In this illuminator the light emitted by a standard flame-proof lamp is evenly distributed over the whole length of the gauge by means of a thick plate of Perspex which eliminates glare.

SAFETY EXHAUST FAN

Keith Blackman Ltd., Mill Mead Road, Tottenham, London N.17, is manufacturing a safety fan for use in plants where inflammable gases may have to be exhausted from a building. It is the "Tornado" Bifurcated Fan Unit, in which the fan casing is split or bifurcated across a diameter and opened out to provide a separate chamber for housing the driving motor, thus isolating it from the fumes passing along the duct which surrounds it. Further, as the motor housing is open to atmosphere, the motor may work at a reasonably low ambient temperature with quite high temperature in the surrounding duct. The motor is readily accessible, and if removed for repairs, the casing will act as a draught exit during the repair or maintenance period.

NO-BREAK CONTINUITY SETS

The Electric Construction Co. Ltd., Wolverhampton, in conjunction with R. A. Lister Ltd., Bursley, Worc., has developed a diesel electric no-break continuity set to work in conjunction with existing alternating current mains to ensure continuity of supply to essential services under all conditions. These sets are provided with a flywheel of sufficient size to ensure that the output of the alternator does not fall below 45 cycles per second with failure of a supply frequency of 50 cycles per second. During this 10 percent fall in frequency, the full load output of the alternator will be maintained, and the engine started via the electro-magnetic clutch. Also during this transition period, the static exciter and regulating unit will maintain the output voltage of the alternator within 10 percent of nominal.

The control panel is provided with a suitable automatic starter to ensure that the motor flywheel is accelerated from "rest," the starting time not exceeding five minutes, with the initial and subsequent starting current not exceeding 300 percent F.L.C. The starting equipment is rated for one start of this duration per hour.

"THERMOGLASS" WRAP FOR PIPE LINES

Fiberglass Ltd., St. Helens, Lancs., in conjunction with D. Anderson and Son, Ltd., has completed development of a new range of outer wrap products for corrosion prevention on pipe lines, to take the place of outer wrap made of felted materials which can absorb moisture and are therefore not completely rot-proof.

This outer wrap is based on fiberglass and is available with either 100 percent asphaltic or 100 percent coal tar saturant, thus making the wrap compatible with all types of enamel. The outer wrap incorporating a coal tar saturant has been developed in co-operation with Wailes Dove Bitumastic Ltd.

SAFETY HOIST FOR THE PETROLEUM INDUSTRY

Herbert Morris Ltd., Loughborough, has developed an air-operated hoist with a view to overcoming the sparking hazard inseparable from most types of electric overhead cranes. The lifting motion only is by air motor, the cross traverse and main travel motions being manually operated by means of crank handles. Other particulars are: span, 23 feet 8 inches; height of lift, 59 feet; hoisting speed, 7 feet per minute; hoisting motor, 13.5 hp at 550 rpm; and air pressure, 90 psi.

OPEN STEEL FLOORING

Fisher & Ludlow Ltd., Birmingham 12, has a new type of open steel flooring named "Flowforge" which is "forge-welded," twisted cross bars being electrically forged into span bars, with no pre-notching to weaken the structure. This method of construction gives great strength in relation to weight of steel used, maximum light passing and ventilation capacity, and no sharp angles to clog with dirt. The twisted cross bars provide a non-slip surface.

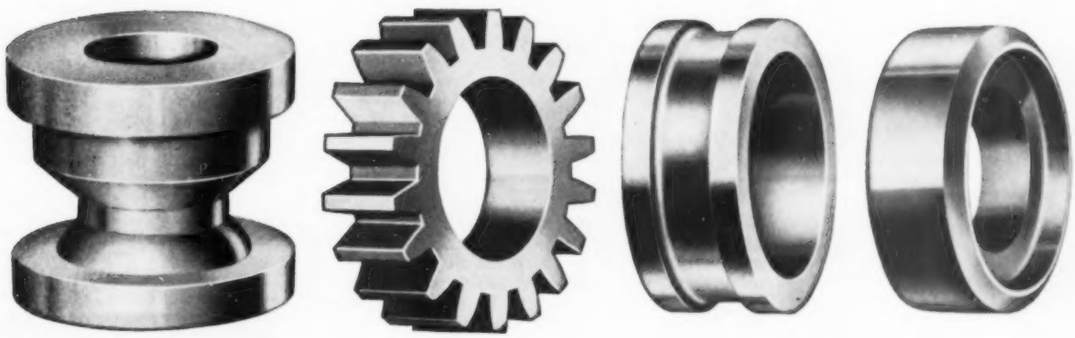
"COLTUF" STEELS

Messrs. Colvilles Ltd., 195 West George St., Glasgow C.2., has developed a new series of steels to combat the incidence of brittle fracture in welded structures which may operate under high stresses or shock loading or at sub-zero temperatures. These "Coltuf" steels have a high manganese content, are "grain controlled" by the addition of silicon and aluminum, and are given a specially controlled heat treatment.

MONEL METAL WELDING FITTINGS

After an extensive period of research, Clyde Tube Forgings Ltd., North Hellington, Glasgow, an associate company of the Shaw-Petrie organization, has begun manufacturing Monel welding fittings. These fittings in the past have been procurable only in the United States.

If you make hollow parts



why pay top price for the holes?

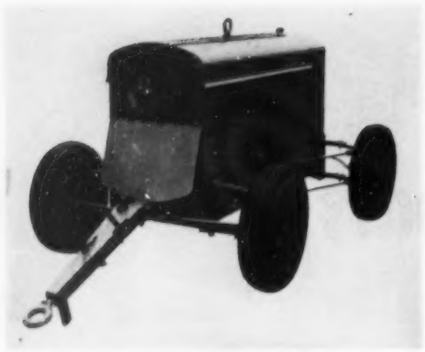
HERE'S a way to save on the cost of the holes in your hollow cylindrical parts. Use Timken® seamless steel tubing. The hole is already there! You eliminate drilling, usually go right into finish boring as your first production step. You machine less metal, get more parts per ton of steel. And the screw machine stations normally used for drilling can be released for other jobs.

And the Timken Company's tube engineering service helps you save even more steel! It recommends the most economical tube size for your job—guaranteed to clean up to your finished dimensions.

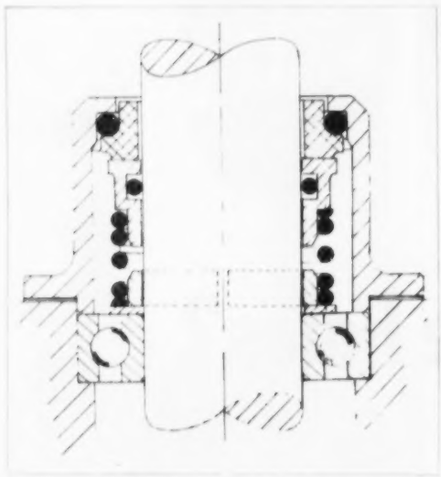
You also get fine forged quality in Timken seamless steel tubing. The piercing process by which it is made is basically a forging operation. It gives the tubing a uniform spiral grain flow for greater strength, and a refined grain structure which brings out the best in the quality of the metal. And due to the Timken Company's rigid quality control, this quality is uniform from tube to tube and heat to heat. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

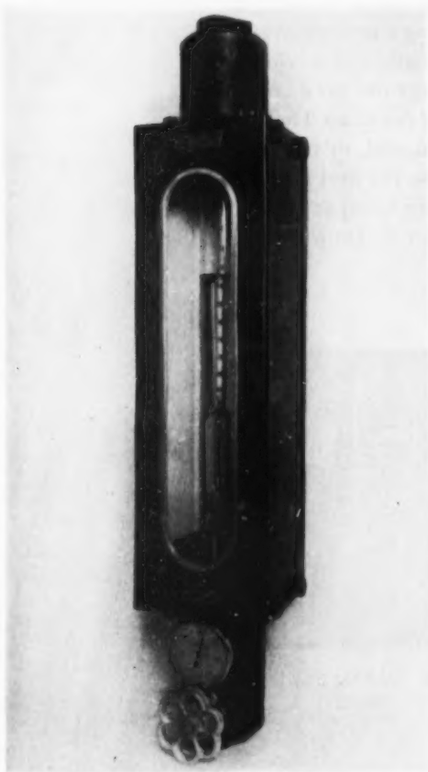
SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING



Lincoln Electric's new S. A. E. 300 generator, powered by Perkins P. 4 diesel engine.



Cross-sectional drawing of Flexibox mechanical seal used on aircraft fuel pumps.



Solway Flowrators' continuous specific gravity tester.

WELDING EQUIPMENT

Lincoln Electric Co. Ltd., Welwyn Garden City, Herts, has produced a new design of welding machine which is more streamlined than its predecessors. This new Lincoln S.A.E. 300 generator is powered by a Perkins P.4 diesel engine and has hydraulic brakes. It is suitable for welding work on large pipe lines, etc.

POROUS CERAMICS

Doulton & Co. Ltd., Doulton House, Albert Embankment, London S.E.1., has produced a F91A filter unit which incorporates a ceramic filter element for use in pneumatic and hydraulic control systems. It offers very little resistance to flow, being able to pass 9 cfm of air or 70 gpm of water for a pressure loss of only 1 psi. In hydraulic or pneumatic control systems, the efficiency is governed by the freedom of operating fluid from solid or liquid impurities, which is attained by a filter of this description. It can easily be cleansed by a blowback.

MECHANICAL PUMP SEALS

Flexibox Ltd., Trafford Park, Manchester 17, has introduced an adaptation of the "Flexibox" mechanical seal for use with hot oil pumps operating at temperatures up to 250°C, provision being made for the coolant to be passed through the stuffing box, the cold liquid acting as a heat-insulating blanket and enabling a normal synthetic rubber seal ring to be used. The special seal for aircraft fuel pumps is now used for engine driven pumps up to 2,000 rpm and on electrical booster pumps up to 20,000 rpm.

TOWER LINING

Metal Propellers Ltd. is now lining mild steel towers with alloy steel to prevent corrosion, has developed alloy steel bubble trays for the same purpose, and patented the "Spotton" reflux divider to enable operators to control reflux ratios in batch distillation plant.

CATHODIC PROTECTION FOR PIPE LINES

Messrs. F. A. Hughes & Co. Ltd., 82 Piccadilly, London W.1., and Westinghouse Brake & Signal Co. Ltd. have pooled their resources in the development of "Westalite" rectifiers, including the patent automatically controlled constant current models. They will be available as part of the "Guardian" Cathodic Protection Service, in which several galvanic anodes have been introduced, effectively covering practically every project where magnesium anodes might be of service in the petroleum industry in addition to the cathodic protection of pipe lines.

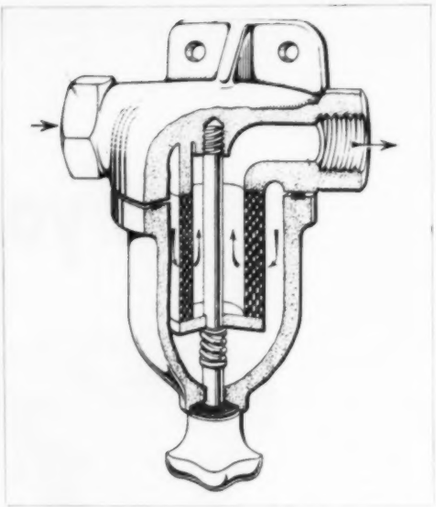
HIGH PRESSURE HOSE

Bowden (Engines) Ltd., Willesden Junction, London N.W.1., has introduced an entirely new "Bowdenflex" high temperature, high pressure hose with detachable end fittings. Linings and the outer covers are made of synthetic specially compounded material. The hoses are made in all sizes up to 2 inches, which size, with a one wire braid, is suitable for pressures up to 500 pounds and with two wire braid up to 1,000 pounds.

SPECIFIC GRAVITY TESTER AND FLOW RATER

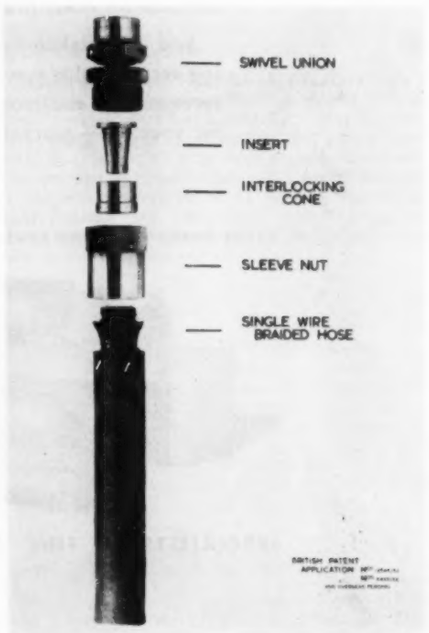
Solway Flowrators Ltd., Park Royal, London N.W.10., has developed a means for continuous checking of specific gravity of any liquid under production.

Liquid enters the bottom connection past a needle valve and into the measuring chamber comprised of a parallel precision bore glass tube. It overflows through two vertical pipes and flows out through the upper connection in the bottom end fitting, thus maintaining a constant level of fluid in the measuring chamber. The average fluid temperature is measured continuously. The hydrometer floats in the measuring chamber, and has a glass lug at the back which is guided by the two outlet stand-pipes, so that the scale always faces forward.



Cut-away view of Doulton F91A ceramic filter unit for use in pneumatic and hydraulic control systems.

Alloy steel is being used to line towers and for bubble trays by Metal Propellers Ltd.



Detachable end fitting for "Bowdenflex" high temperature, high pressure hose.

Brazilian Oil Bill

The debates on the Petroleum Bill have been closed and the project will now return to the four Special Commissions for report on the numerous amendments submitted during the discussions. The Commission for the study of questions affecting the Constitution and justice will also have to pronounce on the amendment in favor of private enterprise, which was approved by the Commission for Transports and Public Works prior to the debates. It has since been stated officially that this amendment is in accordance with the view of President Vargas.

The National Economy Council, reporting on the bill, pronounced in favor of the government project creating Petrobras, but condemned the tendency to amplify the State's action and permit it to monopolize prospecting and exploitation. The exclusion of private enterprise, national and foreign, the report says, cannot be justified on the grounds of national security or public order. Such a policy will retard production and raise obstacles to the participation of private Brazilian companies in the exploitation of oil in neighboring countries (in the Bolivian oilfields, for instance), which represents an important part of Brazil's policy in relation to liquid fuels. For these reasons the National Economy Council relies on leaders and legislators to find a formula to restore the oil problem to a sound basis.

General Ismar de Goias, who reported on the Petrobras project for the Armed Forces Commission, announced recently, "Petroleum, as quickly as possible and by no matter what process, is what interests Brazil. That, briefly stated, is the opinion of the High Command of the Armed Forces."

Oil Find in Portugal

The Companhia dos Petroleos de Portugal, owned 51 percent by the Portuguese government and 49 percent by the Swedish firm of A. Johnson & Co., has opened up a crude deposit about 25 miles north of Lisbon. The discovery well, Abadia 1, may turn out to warrant the first economic oil yield in Portugal. Abadia 1, which is situated on the crest of the salt structure of Torres Vedras, was located upon the advice of German geologists employed by the Cia. dos Petroleos. The oil was encountered in sandy-marly layers of the Malm, at a depth of only 472 feet. Initial production tests resulted in a daily influx of 30-40 liters of heavy oil. When for some days oil had been obtained, a strong influx of natural gas occurred. The hole is now shut in. It is intended to sink another, deeper well with a larger diameter at the same spot.

Agreement Unratified

The Bolivian vice-president, Sr. Hernan Zuazo, told the press when he visited Rio de Janeiro that the agreement signed in February 1952 between Brazil and Bolivia for the exploitation of the latter's oil reserves still awaits ratification by both countries. The delay, he added, is due to the revolution, which has left Bolivia with many vital problems to solve, but she will fulfill her agreement with Brazil as soon as circumstances permit.

Opens Edmonton Warehouse

Cooper-Bessemer of Canada Ltd. recently opened a branch office and parts warehouse in Edmonton, Canada, under the direction of Edward D. Van Fossen. Heading a factory-trained service staff at the Edmonton warehouse is Al Rothenbuhler, serviceman at Cooper-Bessemer's warehouse in Great Falls, Mont. since 1949. Assisting Mr. Rothenbuhler is William Munro, warehouseman who was formerly with the British Columbia Power Commission. Mr. Van Fossen comes from Cooper-Bessemer's district office in Seattle, Wash.

Brazil's Imports Higher

Between 1951 and 1952, Brazil's imports of gasoline increased from 1,976,067 to 2,406,706 tons; fuel and diesel oils, from 2,750,264 to 3,180,797 tons; and kerosine, from 280,532 to 352,866 tons.

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OTIS PRESSURE CONTROL, Inc.

BRITISH OIL NEWS

By E. Lawson Lomax

Anglo-Danish Trade

An agreement has been concluded between Esso Petroleum Co. Ltd. and the Danish Esso Company whereby the Danish company will purchase a total of between 600,000 and 700,000 tons of petroleum products from the former company during 1953. The value of these sales will be more than £7,000,000.

Development at the Fawley Refinery has been so considerable as to enable substantially all of Esso's requirements in the home market to be met and to provide products for export.

Air Search for Oil in Papua

Hunting Geophysics Ltd., a subsidiary of Hunting Aerosurveys Ltd., London, is conducting an airborne magnetometer survey of a large area in Papua under contract to the Australian Petroleum Co. Pty. Ltd. and the Island Exploration Co. Pty. Ltd. The flying of the survey is, by arrangement, being carried out by Aeromagnetic Surveys Ltd., the Canadian associate of Hunting.

This latest project is one of many exploratory enterprises undertaken by the prospecting companies during the past 16 years (with the exception of the war years) in an exhaustive search for oil in New Guinea. At present there are two geological and three geophysical parties working on the ground in extremely difficult conditions.

Inaugural Ceremony At Kwinana

On January 29, the Premier of Western Australia, Sir Ross McLarty, turned the first sod on the site of Anglo-Iranian's Kwinana refinery near Freemantle in the presence of members of his government, the leader of the state opposition, the Hon. A. R. G. Hawke, the leader of the opposition in the federal parliament, Dr. Evatt, and company representatives.

The first shipload of steel tankage has arrived from the U. K. and a further 4,000 tons of steel, cement and construction equipment is on its way.

Work has started on a construction camp at Kwinana to accommodate 400 men and on the first 120 houses to be built in a new township near the refinery. Bulldozers are clearing new roads on both refinery and township sites, while several miles of water piping have already been laid.

A deep shipping channel through two sandbanks at the entrance to Cockburn Sound, on which the tanker terminal will be built, is being made by two suction dredgers, requiring the removal of seven million cubic yards of sand to make a channel 38 feet deep and 500 feet wide.

Sir Ross McLarty, Premier of Western Australia, turns over the first sod on site of new Anglo-Iranian refinery near Freemantle.

Depot for Underwater Oil Search

Shell Petroleum Co., which is engaged in submarine drilling under Lake Maracaibo, Venezuela and off the coast of North Borneo, a few months ago acquired a concession from the Sheikh of Qatar for similar exploration beneath the waters of the Persian Gulf. The company has purchased a cargo vessel from the Elder Demporter Lines and is converting it into a depot ship for service in connection with these searches.

This vessel of 4,081 gross tons, the "McGregor Laird," will be able to carry sufficient stores for a six months absence from base in addition to all drilling equipment required. During conversion the living quarters will be expanded to accommodate 150 persons, while air-conditioning equipment, workshops and a distillation plant to make fresh water from sea water will also be added.

Evaporation Plant for Aden

Anglo-Iranian Oil Company has placed an order with G. & J. Weir of Glasgow for an evaporating and distilling plant to be installed in the company's new refinery at Aden. It will supply 400,000 gallons of fresh water daily from sea water, the only available source of water for the refinery's use.

The plant will consist of three Weir triple-effect evaporating and distilling units, each with an output of 134,000 gallons per day. Each is a self-contained unit with all the necessary fittings, including complete equipment for spraying and quenching the coils for scale cracking when necessary.

First All Gas Turbine Tanker

The first order ever given for a tanker to be propelled solely by gas turbine has been placed with Cammell Laird & Co. Ltd., Birkenhead, by the Anglo-Saxon Petroleum Co. Ltd., operators of the Shell tanker fleet. A single screw vessel of 18,000 dwt, she is scheduled to be completed in 1956, and will be one of the "general purpose" tankers of which there are 50 on order or under construction for Shell. As the others will be powered by either steam turbo-electric machinery or by geared steam turbines, a direct comparison of the operating and maintenance costs of the three forms of propulsion will be obtained.

The gas turbine components will be made jointly by the British Thomson-Houston Co., who were the designers of the first gas turbine, later fitted in the tanker "Auris" under the lead of John Lamb, head of Shell's Marine Research department, and Messrs. Cammel Laird.

The propulsion machinery will comprise two gas turbo-alternator units driving the single propellor shaft through two electric motors and a two-pinion single reduction gear box. Power for all auxiliary requirements at sea and in port will be drawn from the propulsion gas turbines, including that required for the 2,000-ton-per-hour cargo pumps. Stand-by power when the gas turbine alternators are not in use will be supplied by a diesel alternator.

Progress at Aden

More than 4,000 men, including about 900 American and British technicians, are now working on the site of the new Aden refinery.

Levelling of the site for the refinery has begun. Prefabricated, air-conditioned living quarters for the technical staff have been erected, and the men originally living on shipboard have been moved into them. Local recruited labor is at present housed in tents, but a proper construction camp, built mainly of local materials, is nearing completion. In addition, workshops, a hospital and a garage have been erected.

Dredging for the oil port has begun, involving the removal of five million cubic yards of sand and pumping it on to the foreshore for ground levelling. Four hundred and fifty feet of the 3,700-foot breakwater to contain the port has also been completed.

Ruston & Hornsby gas-turbine power unit.

Gas-Turbine In Commercial Production

After several years of intensive research in conjunction with the Ministry of Fuel and Power, the firm of Ruston & Hornsby Ltd., in association with Davey, Paxman & Co. Ltd., built a prototype of a gas-turbine power unit of 750 kw. capacity which has been under test for three years and has now completed over 3,000 hours' running on a variety of fuels, including a 700-hour non-stop run.

As a result of this test work, modifications have been made to the original design to insure greater efficiency and ease of maintenance.

The method of air-cooling adopted achieves its purpose with little or no addition to the power required for compressing the air. In addition, it has been found possible to start up the turbine and place it on load regularly in a very short time, without damage to the rotors or distortion developing in the stators, all parts of the machine between the combustion chamber and the final exhaust being now made in a double skin cooled construction.

A large amount of work has been carried out on the combustion of various types of liquid and gaseous fuels, ranging from relatively pure methane producer gas to casing head gas, gas oil, coal-tar fuel and heavy Bunker C fuel, with complete combustion in all cases.

An epicyclic reduction gear, the internal components of which have been designed by W. H. Allen Sons & Co. Ltd., is used for the transmission of power from the power turbine to the driven machinery (which normally is a generator) and to prevent any binding.

Announcement has been made that the improved gas turbine is now in production. Of the first lot of 18 put out, three are assigned to the Air Ministry, one to the Admiralty, and one to Kuwait Oil Company for pumping oil from the gathering center in its Burgan field, one to Crittall Manufacturing Co. to operate on coal-tar fuel, one to an undisclosed purchaser and the remainder to stock for future sales.

Bitumen Tankers for Kuwait

Messrs. John I. Thornycroft & Co., Ltd. report receipt of a repeat order from the Kuwait Oil Co. Ltd. for the supply of six 2,000 gallon bitumen transporter tankers for the delivery of hot bitumen from the company's refinery at Mina-al-Ahmadi to storage tanks at mixing depots 30-50 miles away, where the bitumen is distributed for road making. The tankers are heat insulated and equipped with two U-shaped tubular heating units.

Opens Research Laboratories

Petrochemicals Ltd. recently completed building new laboratories at its Partington, Cheshire, works, which were opened by Sir Robert Robinson. Sir Robert said at the opening ceremony that "no chemical company worthy of the name can hope to succeed unless it has established an active research department in constant touch with every field of industrial endeavor and able to open up new lines of development."

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Plan Platforming Unit

A 16,000-barrel catalytic reforming unit will be built by Sinclair Refining Co. at its Marcus Hook, Pa. plant as part of a $14 million project. Construction contract for the catalytic reformer has been awarded to C. F. Braun & Co., with completion of the unit scheduled for the summer of 1954.

The catalytic reformer will employ a new processing method and a platinum catalyst recently developed by Sinclair Research Laboratories, Inc. and Baker & Co., Inc., platinum specialists. Aromatics will be produced.

Fluid Level Instrument

Howard Supply Company has developed a portable instrument known as the Fluid Log to quickly determine the fluid level in oil wells. The fluid level of a well can be determined in less than five minutes by means of a tuning fork.

Timken Company Promotes Two

S. C. Partridge, general manager, industrial division of The Timken Roller Bearing Co., has announced the appointment of Robert C. Morgan as district manager, Moline, Ill., office, and Robert L. Williams as district manager, St. Thomas, Ont., office.

Oil Prices and Competition

The American Petroleum Institute, 50 West 50th St., New York, has published "Oil Prices and Competition," a 62-page study by Harold Fleming of the forces which operate in the oil industry today to create retail markets. The job was undertaken with the thought that it could be completed in a month with about 5,000 words. Before the book was finished, four drafts were written and 18 months devoted to investigation and writing. Copies of the book are available in paper at 50 cents and with hard covers at $1.

H. E. Schaller

Heads Radiation Logging

Herman E. Schaller, sales engineer of McCullough Tool Co., has been appointed western division sales manager, radiation logging department. His oil field engineering experience includes three years with the Conservation Committee of the California Oil Producers as a field engineer, one year with The Texas Co. as development engineer, two years with Eastman Oil Well Survey Co. as sales representative and division sales manager, and four years with McCullough Tool Co.

McCloy Elected to Westinghouse Board

Gwilym A. Price, president of the Westinghouse Electric Corporation, recently announced election to the Westinghouse board of directors of John J. McCloy, former U. S. High Commissioner for Germany and now board chairman of The Chase National Bank of the City of New York. As a new Westinghouse director, Mr. McCloy succeeds Winthrop W. Aldrich, now U. S. Ambassador to Great Britain, whom he also succeeded as Chase board chairman.

Livingston Elected McKee Vice President

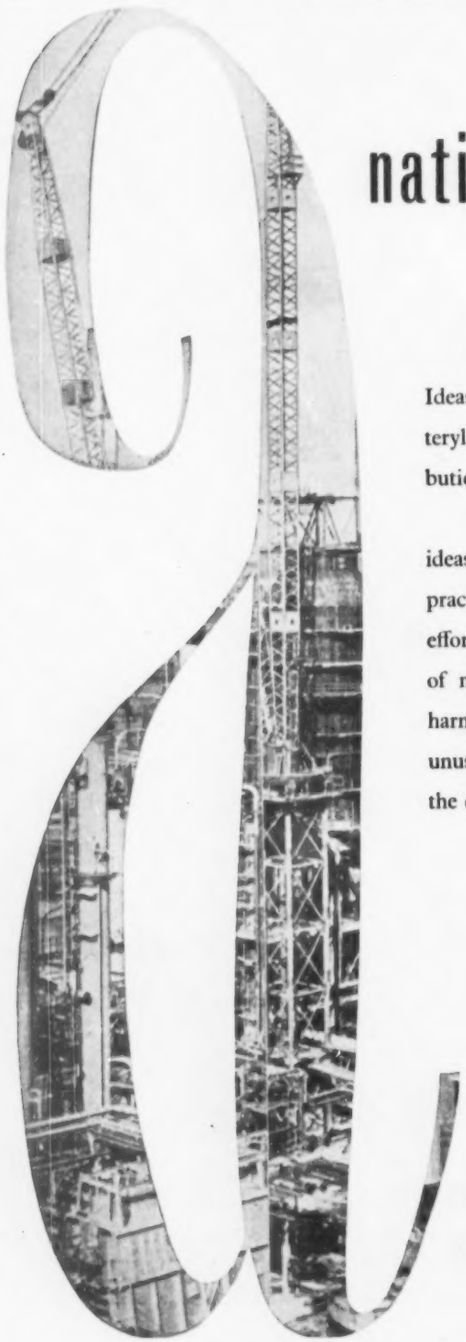
Myron J. Livingston was elected a vice president of Arthur G. McKee & Co., Cleveland, at the recent annual meeting. He is to be in charge of the company's petroleum refining division. For the past year Mr. Livingston has been assistant to President H. E. Widdell. Prior to that he was sales manager of the refining division. All members of the board of directors were re-elected as were other company officers.

1952 Rocky Mountain Oil Resume

The 23rd Annual Resume of Rocky Mountain Oil & Gas Operations, ($10.00), has been published by Petroleum Information, Denver. The book presents a complete review of the operations of the oil industry in the region during 1952, which was by a considerable margin the greatest oil year of record in the Rockies.

The book is organized by basins rather than by states, and follows the pattern that the actual work done in the region has taken. Each of the areas of similarity of interest is presented as a unit, and a resume, plus maps of important developments and discovery well reports, is presented for each basin. Plats of the immediate area of each discovery are part of the reports, and a log section showing the pay zone of each of the 96 discoveries is included.

The resume section of the book requires 205 pages for compilation of the record volume of work done in 1952. In addition there is a statistical section which lists the 2,357 wells completed in 1952 with operator, location, total depth and status, and a field production report for the region during the year which requires 130 additional pages.



nation needs ideas...

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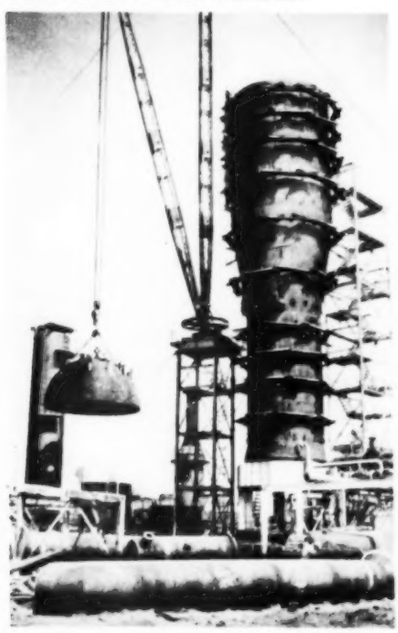
REFINERY PROCESS NEWS

PUBLISHED BY REFINERY PROCESS DIVISION, THE M. W. KELLOGG COMPANY JULY 1953

First Inverted Orthoflow Unit Completed Soon

Shown here as it passed the 75%-completion point is the first of the new type Orthoflow Fluid catalytic crackers. It is currently about to be placed on stream at a major Mid-western refinery.

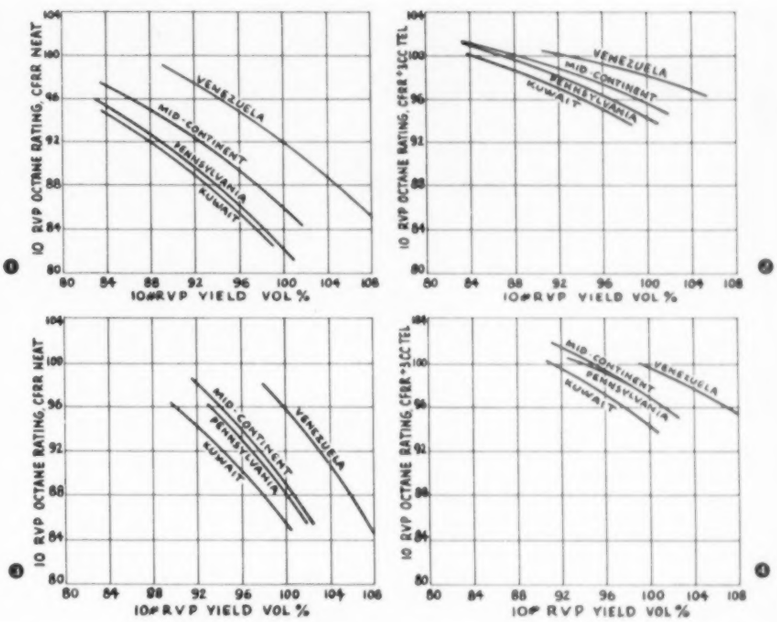
Known as the Model "B" Orthoflow, it is a variation of the original Orthoflow design. Principal reason for the new design, with the regenerator above the reactor, is the expected reduction in the operating costs in comparison with the conventional Model "A" unit, several of which are now operating in the United States and Canada.



The regenerator of the Model "B" design operates at a lower pressure than the reactor in order to maintain the required flow within the system. Thus compressed air is being charged to the vessel which is at the lower pressure as opposed to the situation in the conventional Orthoflow where the regenerator is operated at the higher pressure.

Eleven Orthoflows, including both types are now either in operation or under construction. With fresh-feed capacities ranging from 2,500 to 28,000 BPD, they are located virtually all over the world. They all represent marked simplification in the Fluid catalytic crack-

(Continued on following page)



Sinclair-Baker Catalyst Promises Substantially Lower Operating Costs and Increased Yields

Employing the recently announced Sinclair-Baker platinum catalyst — a joint development of Sinclair Research Laboratories, Inc. and Baker & Company — Kellogg's new catalytic reforming process is expected to produce excellent yields of high octane product from a wide variety of feed stocks.

The new catalyst is a regenerative type and has two major advantages over existing commercial platinum catalysts: (a) the catalyst maintains high activity over considerably longer periods of time, resulting in substantially lower catalyst operating costs, and (b) it has a greater ability to convert low octane paraffinic components to high octane aromatics.

In addition to this ability to aromatize paraffins, the undesirable hydrocracking of feed to butane and lighter gases is minimized, more hydrogen being produced. Further, the regenerative properties of the catalyst provide means of reactivating it in place in case of process upsets. Regenerative processing gives maximum catalyst life, in terms of barrels of production per pound of catalyst, while maintaining optimum yield-octane ratios.

Catalytic reforming at moderate pressure with this catalyst is summarized by the yield-octane curves shown above for typical naphthas. Figure ① presents the data for 10# RVP clear research octane and Figure ② the data on a leaded basis — both for continuous processing. Figures ③ and ④ give the data for the regenerative process for 10# RVP clear and 3cc leaded bases.

In all cases, outside butane may be used to produce 10# RVP reformate. Low C_3-and-lighter gas yields reflect the selectivity of the catalyst. The high net hydrogen production offers an important refinery source of H_2 for desulfurization and petrochemical processing.

Since it is now fairly certain that the octane demands for future automotive transportation will require naphtha reforming, the choice of one of several reforming processes becomes important. The selection should take into account royalties, yield/octane ratios and catalyst productivity. Preliminary data indicate that reformate production will range from 20 to over 200 bbls. per pound of catalyst, depending upon the feed stock and the product quality required. Direct operating costs for labor, utilities and maintenance should not exceed $0.20 per barrel of reformate.

REFINERY PROCESS NEWS

CONTINUED FROM PRECEDING PAGE

Inverted Orthoflow.... cont.

ing process from a mechanical engineering standpoint... and have continued to display the overall ease of operation typical of the Fluid process.

Tests during a period of more than three months also prove that the catalyst loss factor of the Orthoflow is now as low as that of the best side-by-side Fluid units. A simple modification in the regenerator of the first domestic Orthoflow has radically reduced the amount of catalyst lost with the flue gases.

This particular unit was originally designed for an 8,300 BPD throughput. Operating on synthetic MS catalyst it is now running regularly at 9,300 BPD, with conversion at 67%. Despite a certain amount of naphtha in the feed, debutanized gasoline averages 93 octane clear.

The other units in operation substantiate the fact that the Orthoflow is simple to operate, produces good yields of high quality products, and the minor modifications made to effect catalyst saving do not alter its basic design advantages or increase its investment cost.

New Australian 70,000-BPD Refinery Well Underway; Will Include Orthoflow

Big things are happening in Australia. Search for oil goes on in the Exmouth Gulf area, and seventeen miles from Fremantle, Australia's largest refinery is being built at Kwinana (see photo) under Kellogg supervision for AIOC. When it comes on stream in 1955, it will process 70,000 BPSD supplying 49% of the country's current needs.

Included in the plant will be two 35,000 BPD atmospheric distillation units—complete with stabilizers, solutizers, and caustic washers—plus a 24,000 BPD vacuum unit. The catalytic cracking plant will be of the new Kellogg Orthoflow Fluid design, similar to units in the U.S. and Canada which are matching the performance records of conventional side-by-side crackers.

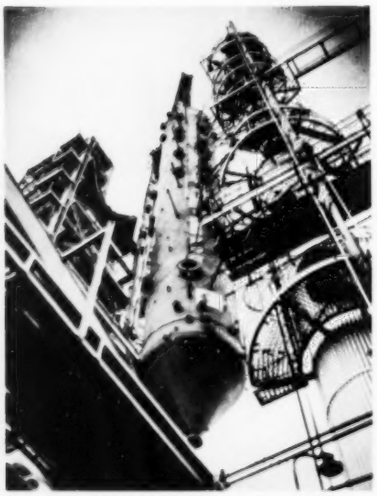
Plant Includes Hydrofiner

Hydrofining will be used for desulfurizing kerosene and gas oil. Hydrogen for this operation will be obtained from the catalytic reforming unit also being installed.

For further information, technical data, etc., on any refining process, write

England's First Deasphalter on Stream

The Kellogg International Corporation, which erected the unit to a Kellogg design, has placed this propane deasphalter on stream at Kent, England. Part of an entirely new refinery, the plant has a capacity of 4,500 barrels per day. It is the first unit of its type to be installed in the British Isles.



Like a Candle Into a Candlestick

...goes this 65-ton fractionating column into a Fluid catalytic cracker in England. Designed by Kellogg it is 106 feet long and 14 feet in diameter. When in service it will handle approximately 10,000 BPD of cracker effluent daily.

When finished, this will be the third Fluid catalytic cracker Kellogg has completed in the British Isles within the past few months.

REFINERY PROCESS DIVISION

THE M. W. KELLOGG COMPANY

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M. W. KELLOGG — A DIVISION OF PULLMAN

C. H. Johnson

GSI Forms Marine Division

Geophysical Service, Inc. has formed a marine division to coordinate the increasing number of field parties the organization has engaged in off-shore seismograph exploration activities.

Division manager is Curtis H. Johnson, formerly assistant chief geophysicist with General Petroleum Corp. Mr. Johnson was president in 1952-53 of the Society of Exploration Geophysicists. He is also a member of the American Association of Petroleum Geologists and the American Geophysical Union.

Since 1948 he has been engaged principally in offshore geophysical exploration for General Petroleum Corp. and has served as chairman of several multi-company committees. For the past three years he has been a member of the Offshore Seismic Operations Committee of the Western Oil and Gas Association.

Book Review

Occurrence of Petroleum in the World, by A. M. Stahmer; *The Search for Petroleum*, by K. H. Wiontzek; and *Oil Drilling and Production*, by K. H. Wiontzek, (all in German), have been published by Verlagsanstalt Huthig and Dreyer G.m.b.H., Heidelberg, under the auspices of the Shell Book House, to put at the disposal of German readers a simple but informative account of where oil is found, how it is found, and when found, how it is produced. The first is 65 pages in length, the second 46 pages, and the third 59 pages.

Elizardi Joins Fluor

J. W. Elizardi, Jr., has been appointed vice president in charge of mid-continent area sales for The Fluor Corp., Ltd. of Los Angeles. His headquarters will be in Houston. He was formerly Gulf Coast manager for The Marley Company. Before that he served for many years as vice president in charge of petroleum sales for The Griscom-Russell Co. in Dallas and Houston.

J. W. Elizardi, Jr.

New Tanker Launched

The "S. S. New Jersey Sun," the second of four supertankers to be built by Sun Shipbuilding & Dry Dock Company for Sun Oil Company, was launched May 16 at the Chester shipyard. Mrs. Robert G. Dunlop, wife of Sun president R. G. Dunlop, christened the vessel.

The "S. S. Delaware Sun," the first of the supertankers, set several fleet operating records on her maiden voyage last winter. The other two supertankers on order for Sun Oil Co. will be delivered during 1954.

The new ship is 641 feet in length, 84 feet in beam, and 45 feet in depth. Her full carrying capacity is 250,600 barrels of oil. Gross tonnage is estimated at 18,750 and trial speed above 16½ knots.

Vapor-Mizer Booklet

Graver Tank & Mfg. Co., Inc., 4809 Tod Ave., East Chicago, Indiana, has available copies of a new 12-page booklet describing the operation of the newest addition to the company's line of petroleum conservation equipment, the Graver Vapor-Mixer. The book gives examples of the saving potential in this patented Graver design.

F. E. Seery

New GATX Pittsburgh Manager

Frank E. Seery has been appointed district sales manager of the plate and welding division, General American Transportation Corp., according to Harold D. Skyrm, vice president. He replaces Ben King Duffy, resigned. Mr. Seery has been with General American for seven years, the past two as assistant to Mr. Duffy. Mr. Seery will be assisted by J. A. Ross, Jr., formerly in the Washington, D. C., office.

Wins Coronation Trip

A coronation-year trip to his native England was one of T. W. Winch's best rewards for a half-century's service with a South African oil marketing company. The 63-year old superintendent of Vacuum Oil Company of South Africa's Durban product warehouse enjoyed a two-month stay in Britain.

Mr. Winch first became an oil "man" at the age of 13, shortly after Vacuum entered business in Capetown. During his career he has seen Vacuum of South Africa, marketing affiliate of Standard-Vacuum Oil Company, grow from a handful of employees in 1903 to a far-reaching organization of nearly 4,000 people. He has participated in the development of a petroleum distribution network which began with hand-cart deliveries of kerosine imported on sailing vessels. Today it is an intricate system of importing terminals, inland bulk plants, depots and service stations handling the full range of modern petroleum products.

He is not yet ready to retire. Before he does, he will witness another major advance in the development of South Africa's oil industry, the opening of the Standard-Vacuum Refining Company's new Durban refinery.

R. G. Hamaker

Hamaker Honored

Rex G. Hamaker's quarter of a century with Reed Roller Bit Co. of Houston was marked the week of June 7 by the presentation of a 25-year service award by S. P. Farish, president of the company. Mr. Hamaker is vice president in charge of sales.

Mr. Farish, president of Reed Roller Bit since 1925 when he and a group of other men bought and reorganized the company, brought Mr. Hamaker from the Humble Oil and Refining Co. in 1928. The two men had been associated since 1919 when both worked at Ranger for Humble, Mr. Farish as head of Humble's northern district and Mr. Hamaker as his district engineer. In 1920 Mr. Hamaker was moved to Houston as Humble Oil's first chief engineer.

Beginning as research and works manager, Mr. Hamaker was elected vice president the following year and named sales manager in 1931. He became a director in 1935 and has been vice president in charge of sales since 1944. In the 25 years since he joined Reed, the company's assets have risen from $1 million to $22 million. Sales have increased from less than $1 million to $20 million per year.

Elected L. A. Desk and Derrick President

Miss Jeannette Funston was elected president of the Los Angeles Desk and Derrick Club for the coming year at the recent annual meeting May 19. She is secretary to H. C. Pyle, president of Monterey Oil Co.

Other officers elected were: first vice president, Mrs. Dorothy Munger, Munger Oilogram; second vice president, Miss Louise Starkweather, Richfield Oil Corp.; recording secretary, Mrs. Dorothy Clancy, Sudduth & Co.; corresponding secretary, Miss Betty Goritz, Western Oil and Gas Association; and treasurer, Miss Minnie Hockett, Bankline Oil Co.

T. W. Winch

OIL COMPANY STAFF CHANGES

FRANK M. ALLEN of Oklahoma City has been named district superintendent in charge of the new Cities Service gasoline plant near Blackwell, Okla. On Mr. Allen's staff at the plant will be Guy W. Duren of Wichita, Kans., who will supervise operations, and F. P. Dyer of Hutchinson, Kans., who will supervise maintenance. The new plant is designed to recover approximately 200,000 gallons of liquid hydrocarbons daily.

Mr. Allen joined the company in 1929. He was named district superintendent of Oklahoma City district operations in 1947 and will continue to supervise operations of Oklahoma City plants.

C. M. WAGNER, director of exploration for the General Petroleum Corp., has announced a series of transfers and promotions of exploration personnel in California.

J. H. Casey, district geologist at Santa Maria, has been transferred to the Ventura Basin district. He is succeeded by R. G. Colvin, formerly assistant geologist at Bakersfield. C. D. Edwards was promoted to district geologist for the San Joaquin district, replacing W. D. Lewis, resigned.

J. P. ENGLE, formerly assistant purchasing agent for Sinclair Refining Company in Houston, has been named purchasing agent of Sinclair Oil & Gas Co. of Tulsa. He succeeds H. A. Woodard, who retired April 30 after 36 years' service. R. D. Troutman has been named to succeed Mr. Engle in Houston.

RICHARD STEINHORST, JR. has been appointed assistant to the general superintendent of production of British American Oil Producing Co. at Dallas. Mr. Steinhorst formerly was with The Texas Co. in the Illinois basin where he was assistant district superintendent.

A. H. WEYLAND has been elected president of the reorganized Arkansas-Louisiana Gas Co. P. J. Erickson, Jr., Earl P. Farmer and J. C. Hamilton of Shreveport, Louisiana, and Harry Hancock of New York were elected vice presidents. Harold G. Walters and T. J. Heard of Shreveport were elected treasurer and secretary, respectively.

Mr. Weyland formerly was vice president and general manager of Arkansas Natural Gas Corp. and president of that company's two principal subsidiaries, Arkansas Fuel Oil Co. and Arkansas-Louisiana Gas Co. Mr. Erickson has been with the Arkansas-Louisiana Gas Co. for many years, and Mr. Farmer has been associated with both Arkansas Fuel and Arkansas-Louisiana Gas. Mr. Hamilton formerly was with Arkansas Natural Gas and Arkansas-Louisiana Gas Co.

ROBERT L. KIDD has been elected president of the newly-formed Arkansas Fuel Oil Corp., Shreveport, La. Mr. Kidd has been in charge of the oil and gas exploration and production activities of the Cities Service Oil Co. (Del.) and in the past five years has directed the greatly expanded exploration and drilling program of Cities Service in the major producing areas of the United States and Canada. He is a vice president of Cities Service of Delaware and of the Canadian producing company.

H. T. Goss and J. A. Welch of Shreveport, and Erle G. Christian of New York were elected vice presidents. Messrs. Goss and Welch were vice presidents of the predecessor Arkansas Fuel Oil Co. M. J. Lasseigne and John S. Sheffield of Shreveport were elected treasurer and secretary, respectively, and have been long associated with the company.

F. M. Allen

R. Steinhorst, Jr.

R. L. Kidd

DR. GEORGE E. HINDS, Houston, assistant to the manager of Continental Oil Company's petrochemical department, has been appointed market development representative for the company's petrochemical department, a newly created position. He will continue to make his headquarters in Houston.

It was announced at the same time that James G. Hough, superintendent of Conoco's petrochemical plant at Baltimore, Md., has been promoted to the newly created position of superintendent of petrochemical manufacturing with headquarters at Baltimore. He will be responsible for the manufacturing activities of the company's Baltimore and Chicago petrochemical plants. Walter Miller, resident engineer at Baltimore, will succeed Mr. Hough as plant superintendent.

GLENN W. CLARK, president of Cities Service Gas Company, and George H. Hill, Jr., vice president of Cities Service Petroleum, Inc., have been elected directors of the parent Cities Service Company. Mr. Clark became president of Cities Service Gas Co. with headquarters in Oklahoma City in 1952, having previously served as vice president and general counsel for that company. Mr. Hill has been with Cities Service since 1945. He is a director in a number of subsidiaries, including Cities Service Refining Corp., Cities Service Research and Development Co., Empire Gas & Fuel Co., and Mexico-Cities Service Petroleum Corp.

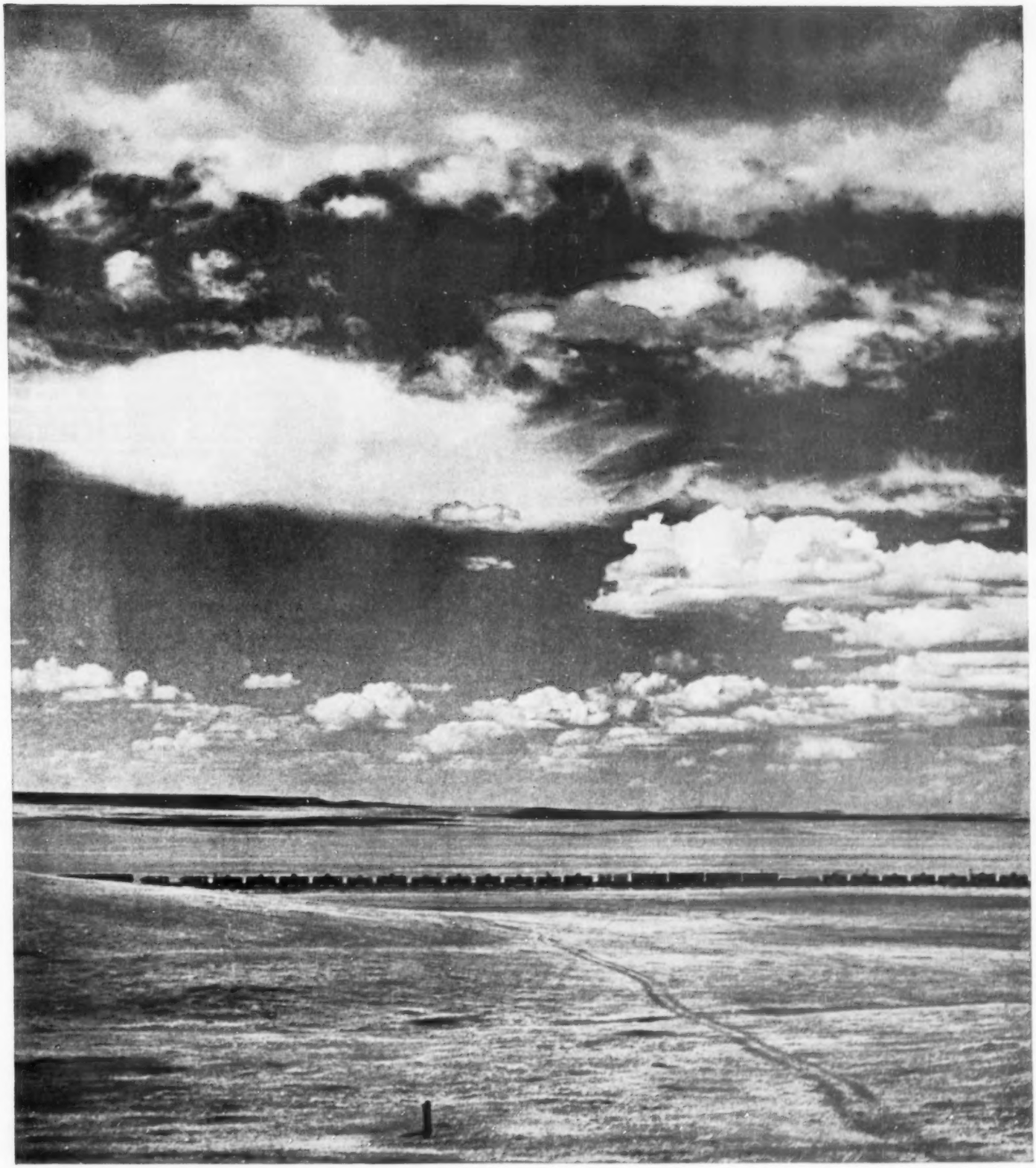
DR. DAVID F. EDWARDS, assistant head of the petroleum products division at the Baton Rouge, La. refinery of the Esso Standard Oil Co., has been appointed assistant general superintendent of the Bayonne, New Jersey refinery. He succeeds W. F. Wadt, who becomes general superintendent of the plant. Dr. Edwards joined Jersey Standard in 1923, serving the company in the East and South America, before coming to Esso in Baton Rouge as head of the refinery's process control laboratory. Dr. Edwards will be succeeded at Baton Rouge by D. O. Swan, superintendent of the refining and oil movement department.

W. G. TAYLOR, assistant manager of the purchasing department of The Texas Company, has been elected chairman of the oil company buyer's group of the Purchasing Agents Association of New York, which is affiliated with the National Association of Purchasing Agents. Mr. Taylor has been with Texaco since 1922. Before becoming assistant manager of the purchasing department in 1951, he was division purchasing agent for Texaco in Chicago.

C. P. BRISTOL has been appointed area manager for Shell Oil Co. at Tulsa. He will succeed W. A Alexander, who is moving to Denver on August 1.

Mr. Bristol joined Shell in 1930 and was named area production manager at Houston in 1950. A year later he was transferred to Tulsa as production manager. Recently he has been on special assignment.

G. H. B. DAVIS has joined the executive staff of Standard Oil Development Co. as coordinator of marketing services and contacts. Mr. Davis joined the company as research chemist in 1927 and later became director of the research division from which he was called in 1945 into the marketing coordination department of the Standard Oil Co. (N.J.)



"The whole oil transportation network exists solely to serve the consumer. His needs are served best by many methods, competing among themselves to make all deliveries more efficient. The fact that pipelines can vie with one another, that tankers actively compete for business, that tank cars and transport trucks are working to prove their superiority to the other, means that customers are better off all around."

STANDARD OIL COMPANY
(NEW JERSEY)
AND AFFILIATED COMPANIES

K. C. Heald

DR. K. C. HEALD, vice president of Gulf Oil Corp. in charge of exploration and production activities, retired June 1. He will continue to carry on certain consulting work. Dr. Heald is a holder of the Sidney Powers Memorial Medal, the highest honor bestowed by the American Association of Petroleum Geologists.

Dr. Heald joined Gulf as chief staff geologist in 1925. He was elected a vice president in 1945 and a director in 1950. At that time he was made responsible for the company's worldwide exploration and production activities. He also has been a member of the Gulf finance committee and its budget, expansion, and policy committees.

R. O. Rhoades

RALPH O. RHOADES, a vice president of Gulf Oil Corp. since 1951, has been placed in charge of the company's world-wide exploration and production activities.

Mr. Rhoades is a Gulf veteran of 27 years. He began his career as a geologist with the Companias del A.G.W.I. in Mexico. In 1926 he joined the Gulf organization and was assigned to its operations in Colombia, South America. A year later he was transferred to the Middle and Far East. Included in his service between 1927 and 1933 were four years in the Dutch East Indies. He was one of the early American geologists to investigate oil properties of the Persian Gulf area, including Bahrain and Kuwait.

In 1933 he was transferred to Pittsburgh as a member of the general office production department geological staff. Two years later, he again traveled abroad to carry out geological investigations in Great Britain, a number of other European countries, and Kuwait.

In the latter country, now the site of one of the world's major oil fields, he became resident geologist during the first year of active operations. Following that he was stationed in London as European representative of Gulf's production department.

Returning to Pittsburgh in 1940, he served in various geological posts. On January 1, 1951, he became executive assistant to the head of the company's production department, and in October of that year was elected a vice president.

J. E. Davis

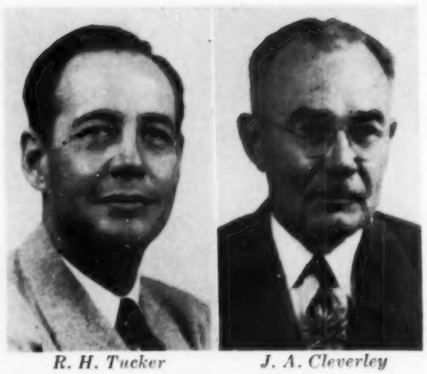
JOHN EARL DAVIS of Shell Oil Co. was elected president of the International Council of Industrial Editors at the recent convention of the I.C.I.E. at Houston, Texas, attended by representatives of 3,000 company and trade association publications in the United States, Canada, Hawaii, Great Britain, and Europe. Mr. Davis has been editor since 1943 of "Shell Progress," a monthly magazine distributed to the oil company's service station dealers and jobbers. Under his direction, the publication has won many awards for excellence.

GERALD McGREW has been appointed manager of the crude oil supply division of Cities Service Oil Co., and Jack G. Coates assistant manager. Mr. McGrew joined Cities Service in 1940 as valuation engineer. He was appointed assistant to the manager of the crude oil supply and transportation division in 1952. Mr. Coates joined the company's training school in 1937 and became assistant manager in the crude oil purchases and sales department in 1950.

C. E. Riddell

CHARLES E. RIDDELL has been appointed exploration manager for The British American Oil Producing Co. in its northwestern division, with headquarters at Denver, Colorado. Mr. Riddell was with United Geophysical Co. in the Middle East as area superintendent for India, Iraq, Iran, and Turkey. He had a crew in Pakistan for the Burma Oil Co., a crew in Turkey for the Turkish government, and a water crew for the Bahrain Petroleum Corp. in Bahrain. Later in South America he had a crew in Tierra del Fuego, Chili, and two crews in Brazil.

Mr. Riddell returned to the United States in September of 1952, at which time he joined the Union Oil Co. as division geophysicist for the Rocky Mountain area. He remained with Union until his appointment by British American.



R. H. Tucker *J. A. Cleverley*

REESE H. TUCKER, manager of the land-geological division, and J. A. Cleverley, manager of oil production, have been elected vice presidents of Cities Service Oil Co. (Del.) Mr. Cleverley also was elected a director. Mr. Tucker was elected to the board several months ago.

Mr. Tucker was first employed by Cities Service in 1930 and, in 1948, was appointed manager of the geophysical department. The following year, he was named chief geologist for the company. His appointment to the managership came in April of 1951.

Mr. Cleverley has been a Cities Service employee since 1920. He has served in various executive capacities in the company's oil production division at Oil Hill, Madison and Russell, Kans., and Oklahoma City. He was transferred to Bartlesville in 1948 and later was appointed manager of the oil production division.

RUSSELL S. MC FARLAND has been elected president of the Seaboard Oil Company of Delaware succeeding John M. Lovejoy, who became chairman and chief executive officer. Mr. McFarland will be in direct charge of operations. James P. Gasser was elected Seaboard's executive vice president, the position formerly held by Mr. McFarland.

Mr. Lovejoy has served Seaboard as its president from 1930, during which period the company has grown from an operation consisting largely of developed production in the Kettleman Hills Field in California to one producing 33,000 barrels of oil per day with operations extending throughout the United States and Canada.

A large part of the company's growth has been accomplished in the mid-continent division, which has been presided over by R. S. McFarland since 1932. From 1916 to 1931, Mr. McFarland was with the Empire Gas & Fuel Co., the Twin States Oil Co. (Sun Oil Co.), and Sunray Oil Co. In 1931 he was placed in charge of some wildcat operations for Seaboard in Canada and in 1932 he moved to Dallas where, as a vice president, he opened an office for Seaboard. This was the beginning of the company's operations in the mid-continent. He became a director of Seaboard in 1945 and in 1952 was made executive vice president in charge of operations in the United States and Canada. He is a past president of the American Association of Petroleum Geologists and has received an award from the Mid-Continent Oil & Gas Association for distinguished service to the industry.

R. S. McFarland *J. P. Gasser*

The Jungle and the Jet

IN THE HEART of the Papuan jungle Anglo-Iranian has drilled its deepest well—nearly 13,000 feet of it! In Sicily, East Africa and England, too, the search for oil goes on. Anglo-Iranian is finding the oil and refining it—turning it to use in a hundred ways, from fuel for jets to fruit tree sprays.

Anglo-Iranian ships the oil it produces in one of the world's largest privately-owned tanker fleets. It refines oil in seven countries. Its markets stretch from Iceland to Tasmania.

With the latest equipment, eager workers and a progressive outlook, Anglo-Iranian is keeping well to the fore in every branch of the oil business.

THE BP SHIELD IS THE SYMBOL OF THE WORLD-WIDE ORGANISATION OF

Anglo-Iranian Oil Company
LIMITED

REPRESENTATIVE IN U.S.A.: A. E. C. DRAKE, 610 FIFTH AVENUE, NEW YORK 20, N. Y.

API Water Disposal Manual Revised

The fifth edition of Volume I of the API Manual on Disposal of Refinery Wastes has been published by the division of refining of the American Petroleum Institute, 50 West 50th Street, New York 20, New York, at $2 a copy. New information in the fifth edition includes the latest design data for gravity-type oil-water separators, based on three years of research and experimentation at the University of Wisconsin under the direction of Prof. G. A. Rohlich.

Other handbooks in the same series are as follows: Volume II—Waste Gases and Particulate Matter (fourth edition); Volume III—Chemical Wastes (second edition); Volume VI—Sampling and Testing Liquid Wastes (first edition in preparation); Volume V—Sampling and Testing of Waste Gases and Dusts (first edition in preparation).

Carter Names New Division Managers

Five new division managers have been named by Carter Oil Co. as part of a decentralization program. Each manager will have a producing region under his control.

George E. Wagoner, Shreveport, La., has been named to the newly established office of western division manager with headquarters in Denver. Mr. Wagoner has been exploration manager for Carter at Shreveport for the past six years.

R. D. Sloan will continue as division exploration manager, and R. S. Frazier, division engineer, will become division production manager.

A. R. West, Tulsa, has been named southern division manager with headquarters in Shreveport. Mr. West joined Carter in 1930 and spent six years with the Tropical Oil Company at El Centro, Colombia, returning to Carter in 1937. He became chief petroleum engineer for Carter in 1946 and since 1948 has been acting manager of the production department. R. W. Beck, Shreveport, is southern division exploration manager, and H. R. Shannon, Denver, division production manager.

O. D. Harper, Mattoon, Ill., has been named eastern division manager with headquarters at Mattoon. Mr. Harper has spent 29 years with Carter and since 1951 has been division superintendent. W. W. Turnbull, Mattoon, continues as acting exploration manager and W. F. Eiting as production manager of the division.

J. J. Mullane, Tulsa, has been named central division manager with headquarters in Oklahoma City. Mr. Mullane became a research engineer at the Carter laboratory in Tulsa in 1938 was assistant chief engineer for Carter from 1943 to 1947, and served as assistant to the president in 1948. For four years he was executive assistant in the production coordination department of Standard Oil Co. (N.J.) in New York, returning to Carter in 1952 in the production department.

R. S. Hicklin will continue as exploration manager and James L. Rogers will be division production manager.

R. W. Gemmer, Billings, Mont., has been named northern division manager with headquarters at Billings. Mr. Gemmer joined Humble Oil and Refining Co. in 1925 and came to Carter in 1937 as a research geophysicist. L. C. Lamar, Tulsa, has been named exploration manager of the division and R. C. Curtis, Billings, remains as production manager.

U. S. Crude Prices Rise

A 25-cent increase in mid-continent crude initiated in May by Phillips Petroleum Co. has been met by most other buyers. The move by Phillips appears to have given satisfaction to certain elements among the independent producers who have been campaigning to restrict imports of foreign oil. It follows the formula suggested recently of setting up a higher price level to compensate domestic producers for building up reserves of domestic oil through proration.

Fears have been expressed by some that the price increase will stimulate drilling and accentuate the current oversupply. Hughes Tool Co. reported on June 15 that 2,822 rotaries were active in the United States and Canada compared with 2,757 on June 1 and 3,032 on June 16, 1952, the high for last year.

Elected Davison Vice President

Dr. Paul W. Bachman has been elected a vice president of The Davidson Chemical Corp. He continues as director of research and development.

Dr. Bachman joined Davison in 1949 as manager of development planning. He has been active in technical aspects of the current Davison plant expansion program, including the planning of the sodium silicate and catalyst plant at Lake Charles, La., opened this year.

W. J. Healy

New Post for De Laval Sales Manager

William J. Healy, sales manager of the De Laval turbine division, has been appointed to the additional post of sales manager for the blower and compressor division. Mr. Healy joined De Laval in 1928 as a sales engineer. In 1950 he was appointed head of turbine sales.

Erratum

The Texas Co. has not as yet been granted the new concessions applied for in Peru and hence has no plans at this time to send rigs or workers to that country. In a report from Caracas published on Page 41 of the June issue of WORLD PETROLEUM it was reported that 30 Venezuelan workers and two rigs would be sent to Peru.

G. E. Wagoner

A. R. West

O. D. Harper

J. J. Mullane

R. W. Gemmer

Esther S. Lyman

Elected Assistant Secretary of Ethyl

Mrs. Esther Stapley Lyman has been elected assistant secretary of Ethyl Corp. She is the first woman to be named an officer of the company. Mrs. Lyman joined Ethyl in 1940 as a secretary in the office of the corporate secretary. She is a member of the Desk and Derrick Club of New York.

Earnings Slightly Lower

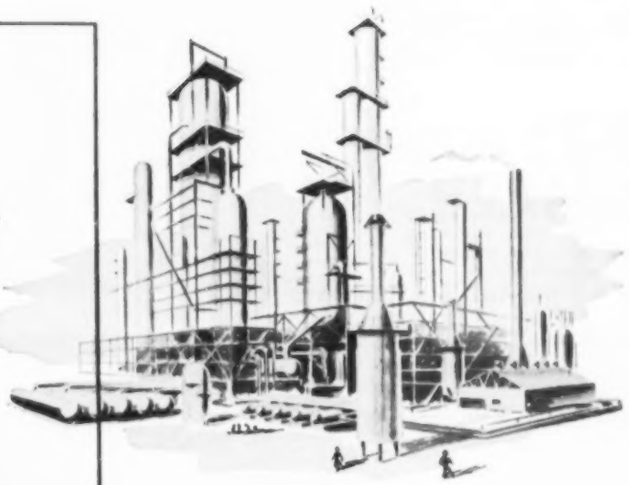
First quarter earnings of 45 oil companies totaled $526 million compared with $536 million in the first quarter of 1952. The decrease was only two percent. Substantial increases in earnings were reported by Continental, Louisiana Land and Exploration, Shell, Standard of California, Tide Water Associated and Union Oils. Details are shown in the tabulation below.

	FIRST QUARTER NET INCOME (THOUSANDS OF DOLLARS)		PER SHARE OF COMMON	
	1953	1952	1953	1952
Amerada	$ 4,346	$4,261	$1.38	$1.35
Ashland	2,945	4,071	.47	.72
Atlantic	11,174	12,689	1.21	1.38
Barber Oil	405	569	.53	.75
Bishop Oil	400	417	.07	.13
Chicago Corp.	1,414	1,454	.40	.41
Continental	10,034	9,386	1.03	.96
Cities Service	16,228	17,115	4.17	4.40
Deep Rock	200	364	.49	.68
Derby Oil	294	90	.63	.20
Gulf Oil	35,629	35,320	1.51	1.50
Honolulu Oil	2,086	2,150	1.11	1.14
Houston Oil	1,916	1,913	1.45	1.45
Imperial Oil Ltd.	9,776	9 193	.33	.31
International Pet. Co. Ltd.	6,190	7,200	.42	.50
Lion Oil Co.	2,840	3,330	.92	1.08
Louisiana Land & Exploration	2,576	1,941	.87	.65
Maracaibo Oil Exploration	95	77	.19	.15
Mid Continent	3,631	4,052	1.95	2.18
Middle States	647	841	.29	.31
Pacific Western	5,064	4,109	.99	.80
Panhandle	266	183	.13	.12
Phillips Pet.	17,755	19,772	1.22	1.37
Plymouth Oil Co.	2,274	2,660	94	1.10
Pure Oil Co.	5,027	7,175	1.10	1.66
Ohio Oil Co.	10,435	10,928	1.59	1.53
Quaker State	526	388	.57	.42
Richfield Oil Co.	6,648	5,689	1.66	1.42
Shell Oil Co.	25,533	24,284	1.90	1.80
Seaboard Oil Co. of Delaware	1,433	1,151	1.18	.94
Sinclair Oil Co.	16,667	20,070	1.36	1.71
Skelly Oil Co.	7,245	7,336	2.35	2.88
Socony-Vacuum	44,000	41,000	1.26	—
Standard Oil Co. of Calif.	42,016	41,791	1 47	1.46
Standard Oil Co. of Ind.	28,050	31,285	1.83	2.04
Standard Oil Co. of Kent.	2,638	2,423	1.61	.93
Standard Oil Co. of N. J.	126,000	132,000	2.08	2.18
Standard Oil Co. of Ohio	4,418	4,430	1.05	1.05
Sunray Oil Co.	6,130	5,624	.55	.52
Tide Water Assoc.	8,822	6,756	.69	.53
The Texas Co.	42,682	42,816	1.55	1.56
Texas Gulf Producing Co.	755	833	.72	.75
Union Oil Co. of Calif.	7,885	6,700	1.45	1.23
Universal Cons. Oil Co.	551	391	.94	.67
Wilcox Oil Co.	225	213	.80	.76
TOTAL	$525,755	$536,376		
DECREASE	2%			

Cardwell Moves New York Office

The Cardwell Manufacturing Co., Inc., has moved its New York office to 277 Park Avenue, N. Y. 17. W. E. Volkman, assistant export manager, is in charge.

a new refinery for INDIA

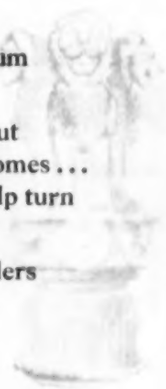


to help raise the pulse beat of industry

Standard-Vacuum has started to build a full-scale petroleum refinery at Bombay*, at a cost of 35,000,000 dollars.

Each year this new installation will be capable of turning out 40,000,000 imperial gallons of illuminating oil for Indian homes . . . *plus* 250,000,000 gallons of other petroleum products to help turn the wheels of India's industry, agriculture and transport.

The manufacture of these oil products within India's borders will serve to strengthen the economic foundations of her freedom and social progress.



**The refinery will be built and operated by the newly formed Standard-Vacuum Refining Co. of India (Ltd.), a subsidiary of Standard-Vacuum Oil Company.*

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SOUTH PACIFIC ISLANDS • SOUTH WEST AFRICA • TANGANYIKA • THAILAND • UNION OF SOUTH AFRICA

Dresser Vice President

Willard M. Johnson, president of Magnet Cove Barium Corp., Houston, Texas, has been elected a vice-president of the parent company, Dresser Industries, Inc. In 1940, Mr. Johnson organized Magnet Cove and has been president of the company since that time. Dresser Industries acquired Magnet Cove in November 1949 and Mr. Johnson was elected a director of the parent company in 1950.

New Wire Rope

Jones & Laughlin Steel Corp. has announced a wire rope with a core that is a coiled steel spring. It is the second recent innovation in wire rope manufacture introduced by J&L in recent weeks. The first was a plastic-core wire rope engineered for use in the cable tool method of drilling oil. The spring-center wire rope was engineered for use in rotary drilling rigs.

Book Review

Synthetic Products and Refinery Processes; Benjamin T. Brooks and A. E. Dunstan; published 1953 by Oxford University Press, New York; 379 large double-column pages. $35.

This large book is Part 2 of Volume 5 of a series of works entitled "The Science of Petroleum" which on the whole constitute a treatise on the principles and practices involved in the technology and distribution of mineral oil. Part 2 comprises 28 separate papers written by 54 American and British experts, and covers the latest (since 1937) advances in the production of synthetic petroleum products including raw materials for rubber solvents, with detailed description of intermediate refinery processes such as distillation, cracking, hydrogenation and dehydrogenation, dewaxing, and alkylation. In highlighting the progress of the past 12 years, the contributors have reviewed and evaluated a vast amount of technical literature which an individual technologist cannot hope to find except in large and complete libraries.

W. M. Johnson

W. C. Behmer

Gas Engine Booklet

Features and job applications of the new International model U-164 gas or gasoline engine are described in an eight-page booklet recently released by the International Harvester Export Co. This model can be tailored to fit a number of requirements by the addition of International-engineered power unit component groups. The U-164 engine delivers 38.5 horsepower while the power unit has a 36.5 hp rating.

Gear-Motors

The function, design, and application of gear-motors are described in a new publication which has been announced as available from the General Electric Company, Schenectady 5, N. Y. Designated as GEA-1437H, the guide describes the standard types of G.E. Tri-Clad gear-motors with ratings from 1/6 up to 200 hp.

Graver Promotes Behmer

William C. Behmer has been appointed district sales manager at Chicago of the Graver Tank & Mfg. Co., Inc. Mr. Behmer has spent more than 15 years with Graver and has been assistant sales manager for the Chicago district since 1951.

Book Review

Book of A.S.T.M. Standards, 1952, including Tentatives, Part 5; published 1953 by American Society for Testing Materials, Philadelphia 3, Pa.; 1,253 pages.

The triennial A.S.T.M. book of standards is now issued in seven parts. The present volume, part 5, comprises all the standard and tentative methods now prescribed for petroleum products, fuels, industrial aromatic hydrocarbons, and engine anti-freezes. Methods are given for measuring and sampling petroleum and petroleum products, coals, coke, and gaseous fuels, with a long chapter on thermometers and general testing methods.

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SMITH SQUARE, LONDON, S.W.I., ENGLAND.

New Dowell Chemical Research Building

Dowell, Inc. has opened a new chemical research building at 1150 N. Utica in Tulsa which contains about 9,000 square feet of floor space divided into three large laboratory areas, a library, fully equipped shop, special instrument room, dark room, locker rooms, a conference room, offices and a reception area.

Dr. Paul H. Cardwell, laboratory director, will supervise an expanded research development program.

The company also has at Tulsa its engineering development and electronic laboratories, equipment assembly shop, chemical manufacturing plant, warehouses, shipping departments, and general offices.

Appointed To AADOC Post

Philip C. Blackburn has been appointed director of engineering and field activities of the American Association of Oilwell Drilling Contractors, succeeding Jack Alexander who left the association to form a service company in West Texas. Mr. Blackburn previously taught drilling mud control and oil field emulsion courses at the University of Texas.

Westinghouse Appointment

F. A. Rall has been appointed manager of the appliance department of Westinghouse Electric International Co. He will be in charge of export merchandising of major and small appliances for the company. He was formerly manager of the distributor relations department.

Pacific Takes Over Gall Pump

Pacific Pumps, Inc., has taken over the manufacture and distribution of the Gall Type M insert oilwell pump and has converted it to API standards. Bulletin No. 120 has been prepared by Pacific to give complete details of the unique new pumps.

B. I. Graves

B. I. GRAVES, who recently retired as a vice president of Tide Water Associated Oil Co., has set up the petroleum consultant firm of B. I. Graves Associates at 52 Wall Street, New York City, to consult on all phases of the oil industry.

Mr. Graves started his career in the oil business in October, 1909, and has had a broad experience in many phases of the industry both in the United States and abroad.

During World War II he was cited for service by the Petroleum Administrator for war, and at present is a member of the National Petroleum Council and a director of the American Petroleum Institute.

Petroleum Information Broadens Service

A new oil news service, *The Rocky Mountain Activity Digest*, furnishing only analytical material, has been announced by Petroleum Information, Rocky Mountain oil reporting service for the past 25 years. The service will primarily emphasize the trend of activity through the Rocky Mountain States, and detail the high points of exploratory development. The new feature is added as a part of the regular service to Petroleum Information subscribers and does not replace the regular report.

Daniels Heads CPA

At a recent meeting of the general board of governors of the Canadian Petroleum Association, C. U. Daniels was elected chairman. Mr. Daniels is president and managing director of Royalite Oil Co. Ltd., and first vice-chairman of the Alberta division of the association.

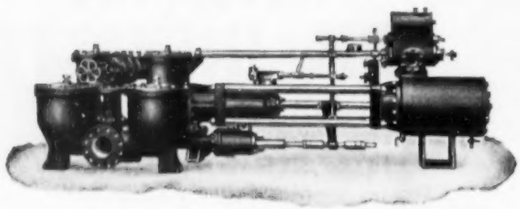
Charles Hay, president and general manager of Hi-Way Refineries Ltd., Regina, and chairman of the Saskatchewan division of the association, was elected first vice-chairman.

A. G. Bailey, vice-president and general manager of Bailey-Selburn Oil and Gas Ltd., Calgary, and chairman of the Alberta division of the association, was elected second vice-chairman. G. L. Humphreys was appointed secretary-treasurer of the association, and R. H. C. Harrison continues as president.

C. U. Daniels

C. Hay

for all refinery duties



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PETROLEUM PRODUCTION ENGINEERING—L. C. Uren "Petroleum Production Economics"	$ 8.00
PETROLEUM REFINERY ENGINEERING—N. L. Nelson	$10.00
PETROLEUM PRODUCTION (5 Volumes)—Park J. Jones	
Vol. I—Mechanics of Production: Oil, Condensate and Natural Gas, 1946	$ 5.00
Vol. II—The Optimum Rate of Production, 1946	$ 5.00
Vol. III—Oil Production by Water, 1947	$ 5.50
Vol. IV—Condensate Production and Cycling, 1948	$ 5.50
Vol. V—Oil Production by Gas & Flooding, 1948	$ 6.00
PRINCIPLES OF PETROLEUM GEOLOGY—Wm. L. Russell	$ 7.00
PRINCIPLES OF SEDIMENTATION—2nd Edition—W. H. Twenhofel	$ 7.00
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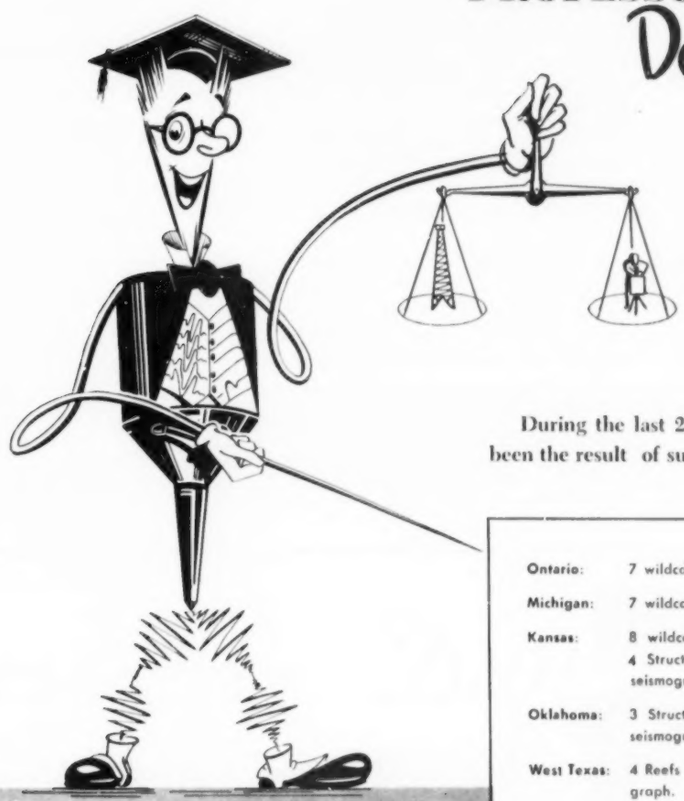

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Lindsay Heads Rockwell Exports

Albert G. Lindsay, former manager of Crosley Corporation's foreign division, has been named manager of the export and international divisions of Rockwell Manufacturing Co., according to an announcement by L. A. Dixon, executive vice president. Mr. Lindsay will make his headquarters at the firm's home offices at 400 North Lexington Avenue, Pittsburgh 8, Pa.

New McCullough Branch

Opening of a new service branch at Magnolia, Ark., was announced recently by McCullough Tool Co. Located on Highway 82, Magnolia, Arkansas, it will service South and Central Arkansas and parts of Northern Louisiana. The new branch, McCullough's 28th in the eastern division, has been placed in charge of John L. Berley, formerly of McCullough's Shreveport, Louisiana, branch.

Air-Cooled Heat Exchangers

A 12-page illustrated bulletin on air-cooled heat exchangers for a wide variety of industrial cooling and condensing applications has been issued by The Fluor Corp., 2500 So. Atlantic Blvd., Los Angeles 22, Calif. Known as Fin-Fan Heat Exchangers, the units described are of the forced draft type and are designed to cool liquids or gases at pressures up to 5,000 psi and temperatures as high as 1,500°.

Type LS Engine Bulletin

A new general bulletin just released by The Cooper-Bessemer Corp., Mount Vernon, Ohio, provides complete data and specifications of Cooper-Bessemer 4-cycle Type LS engines of 15½" bore and 22" stroke. Engines are operated by gas, gas-diesel and diesel, atmospheric or supercharged, and are rated from 690 to 2,500 hp. Write Cooper-Bessemer and ask for Bulletin L-71.

Shown above is the MC-4, first tandem-rotor helicopter certificated by the U. S. Civil Aeronautics Administration for commercial use. In the flight shown, the machine is piloted by Al Bayer, director of sales, flight and services for McCulloch Motors Corp., builders of the plane.

New Bethlehem Office

Bethlehem Supply Company announces the opening of a new sales office in the Patterson Building, Denver, Colo.

R. R. Estes, formerly at Casper, Wyo., will be special representative in charge of the new sales office which will be under the direct supervision of E. S. Lewis, Rocky Mountain district manager.

Joins Warren-Bradshaw Co.

Roy H. Langford has joined Warren-Bradshaw Exploration Co. of Tulsa, Okla., in the capacity of special representative in charge of contracts and public relations for the company's drilling department.

McKee Promotes Refinery Engineers

James N. Garrison has been appointed special projects engineer of the petroleum refinery division of Arthur G. McKee & Company. Prior to his new appointment, Mr. Garrison served as the chief engineer of this division.

James C. Baird has been appointed chief engineer of the petroleum refinery division. He was formerly assistant chief engineer.

New Shell Ethylene Oxide Study

Data on ethylene oxide and ethylene glycol by the new Shell process has just been published by The Lummus Company in a comprehensive report. Copies can be obtained by writing to The Lummus Company, Room 359, 385 Madison Avenue, New York 17, New York.

Sun Creates New Research Divisions

Creation of several new staff positions and six new divisions within Sun Oil Company's research and development department has been announced by Dr. J. Bennett Hill, department director. Dr. Charles L. Thomas, formerly manager of the research laboratory at Norwood, Pa., will be associate director of the department in charge of all line activities. His headquarters will be at Marcus Hook, where Sun is currently building additional laboratories.

Three newly-created staff positions as assistant directors will be filled by Norman Thompson, formerly assistant superintendent of Sun's Marcus Hook refinery; John G. Moxey, Jr., formerly manager of the automotive laboratory; and James I. Harper, formerly chief of the process development section, development laboratory.

Six new divisions and their heads are: W. Herman Barcus, manager of new products development; Earl M. Honeycutt, new process development; Dr. Robert M. Kennedy, basic research; Steward S. Kurtz, Jr., analytics; William A. Casey, technical service; and J. Harold Perrine, administrative.

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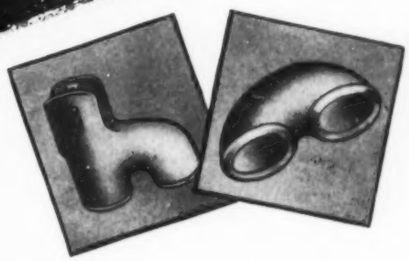

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Has one cleanout opening only opposite tube hole, so that by using on alternate end of furnace, each tube can be effectively inspected and cleaned.

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Standard Welding 180° U Bend with extra heavy outer wall to ensure longer life.

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THE Air Motor "Skatoskalo" Set enables the operators to descale and clean tubes in the shortest possible time with the greatest efficiency. The air motor gives more horse-power and does not stall when heavy deposit is encountered.

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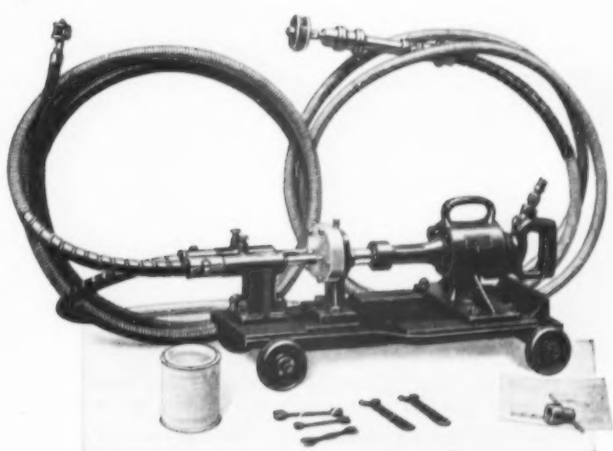
"Skatoskalo" equipment can be used with complete safety and is recommended for the efficient maintenance of cracking plant, boilers, evaporators, condensers, heat exchangers, etc.

Tubes of 5/8" internal dia. upwards can be thoroughly cleaned by "Skatoskalo" Air Tools.



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Brand Elected Sonneborn Vice President

Edgar E. Brand has been elected vice president of L. Sonneborn Sons, Inc. He has been an assistant vice president. Rudolph Cubicciotti, formerly general manager, also was elected a vice president, and Dr. Henry Sonneborn, 3rd, was promoted from assistant secretary-treasurer to secretary. Mr. Brand, Mr. Cubicciotti, and Dr. Sonneborn have all been associated with the company for many years. L. Sonneborn Sons, Inc. is celebrating its 50th anniversary this year.

New Carbon Black Company

Continental Blacks, Inc., a newly-formed organization, will build at $2,750,000 plant at Ponca City, Okla., designed to manufacture 40 million pounds annually of high abrasion black from oil. Organization of the new company was announced by L. F. McCollum, president of Continental Oil Co., and Robert I. Wishnick, New York City. Continental, Mr. Wishnick and The Shamrock Oil and Gas Corp., Amarillo, will be joint owners of the new enterprise. Construction is expected to be completed by mid-1954.

ASME Meeting

The American Society of Mechanical Engineers, Petroleum Division, will conduct its annual petroleum mechanical engineers conference at the Rice Hotel in Houston September 28 to 30. L. S. Wrightsman of the Humble Pipe Line Co., Houston, Texas is general chairman. Dr. E. N. Kemler of the University of Minnesota is chairman of the ASME Petroleum Division.

SALES MANAGER wanted for drilling equipment. Applicants should have field experience. Knowledge of diesel engines desirable. Apply stating age, experience and salary required to Personnel Manager, Box 100, WORLD PETROLEUM, St. Paul's Corner, Ludgate Hill, London E. C. 4, England.

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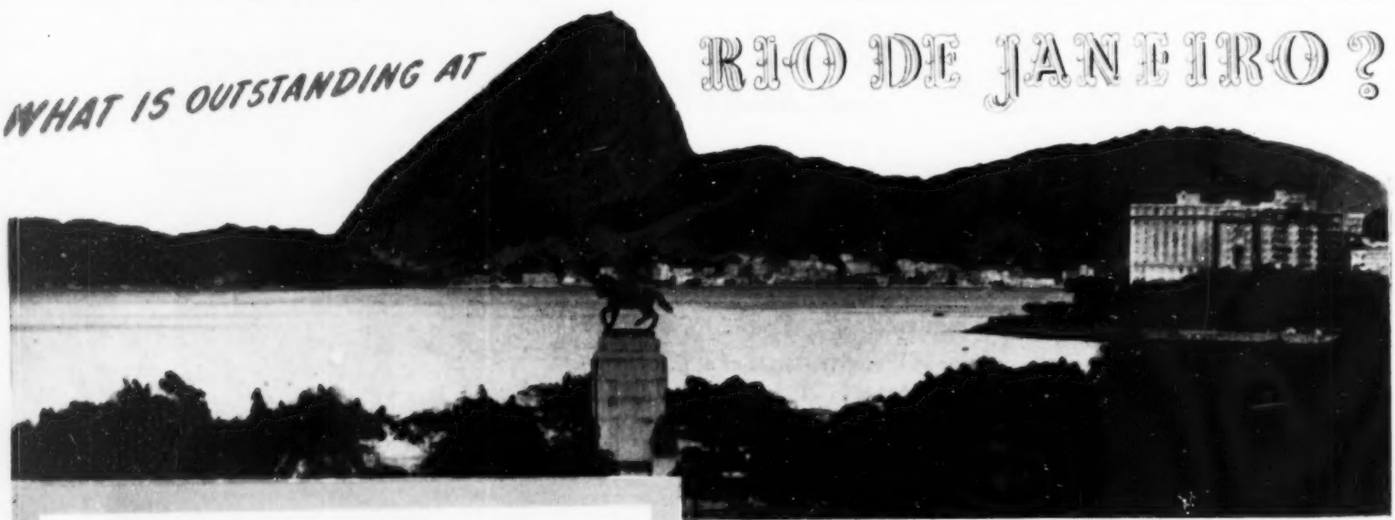
WHAT IS OUTSTANDING AT RIO DE JANEIRO?



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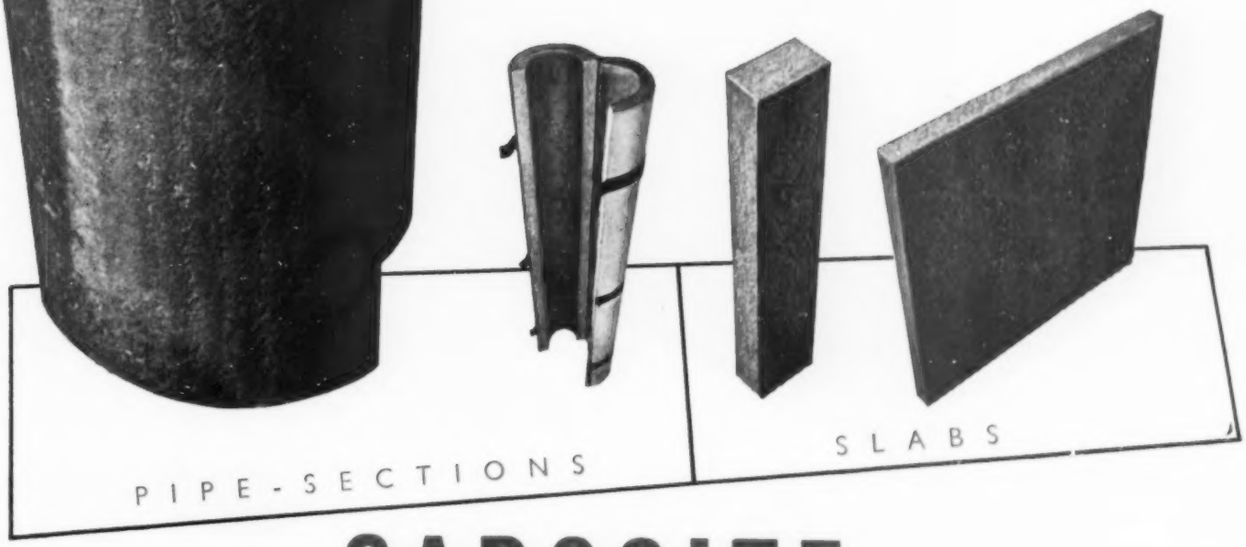

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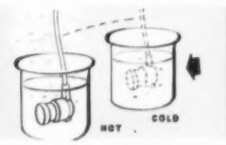
Designed to form a snug, trouble-free connection and eliminate time consuming field maintenance. Its sockets fit onto durable beryllium copper base-plugs made exclusively for General. This new feature is the only successful development of its kind now in use.

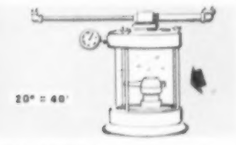
4 RIGID TESTS

SNAKE KILLER TEST:
Pig tail end is attached to mechanical whipping arm. Rapid jolts test durability of the unit and its connection.



HOT AND COLD WATER TEST:
To test moisture resistance, unit is submerged in boiling salt water then in iced salt water.

TUMBLER TEST:
Unit is in perfect condition after 20 hours of severe pounding against sides of iron case.



PRESSURE TEST:
In water filled pressure chamber, unit remains under 20 lb. pressure for 7-day period.

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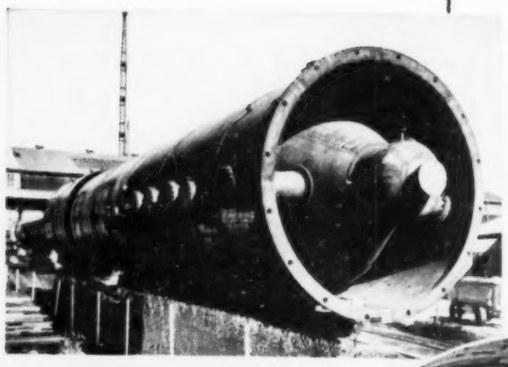
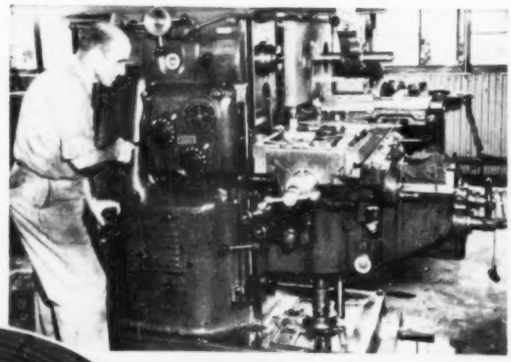
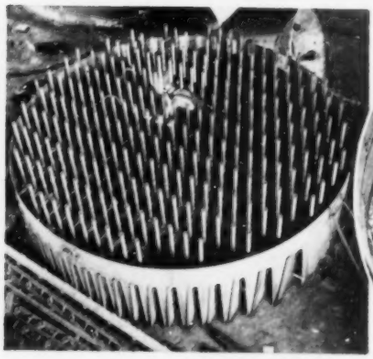
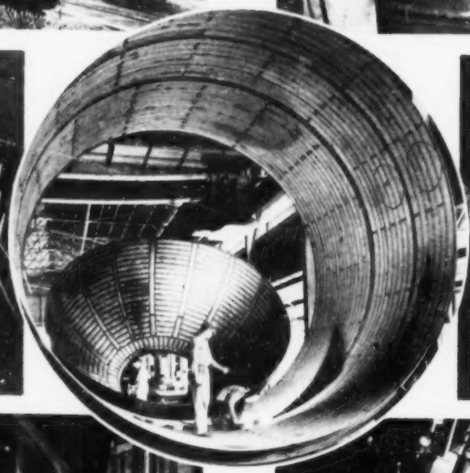
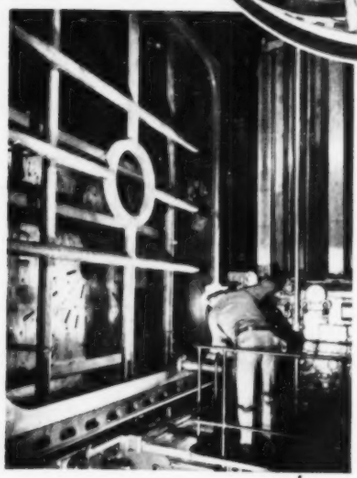
The Fine Art of Doing Things Well











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